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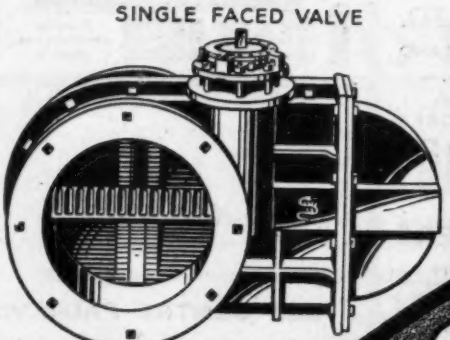

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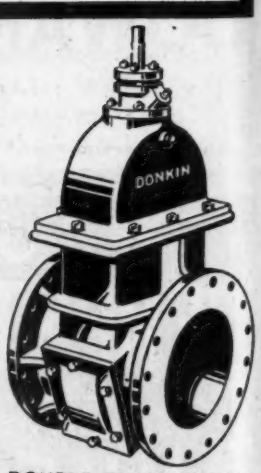

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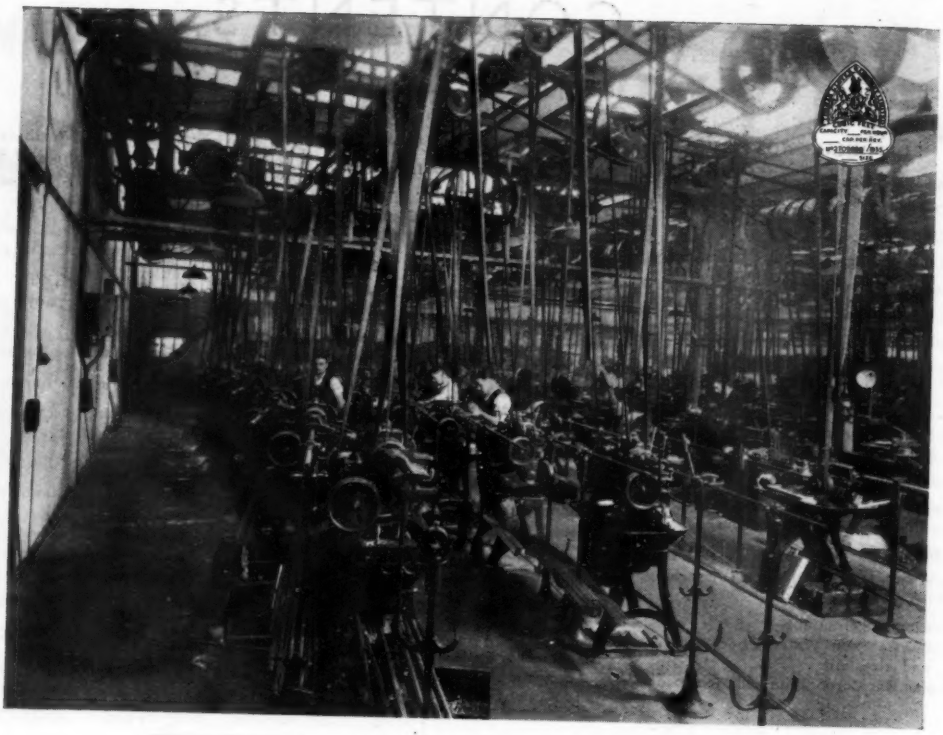

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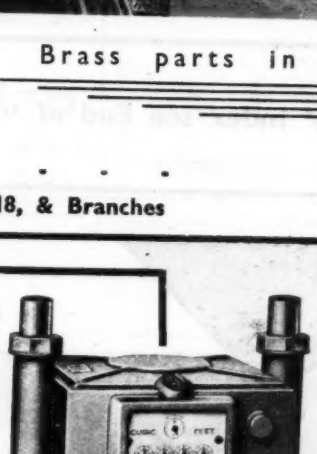

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Gas Journal

JUNE 26, 1935

Vol. 210. 87th Year No. 3762

Editorial Notes

Carburetted Water Gas

An outstanding feature of this year's General Meeting of The Institution of Gas Engineers was the Lecture by Dr. Arthur G. Glasgow, who during the course of the proceedings was elected an Honorary Member of the Institution—a recognition of his great services to the Gas Industry, for the progress of which he has worked unremittently for fifty years. The story of the British Gas Industry would have been very different had not Dr. Glasgow introduced carburetted water gas to this country and established the firm of Humphreys & Glasgow in London in the year 1892. Development of carburetted water gas plants and refinements to the process have been continuous since that time, and completely automatic units are now available to all gas undertakings irrespective of size. Application of the process has without question raised the standard of the Industry's service to the public. Our Industry has an enviable reputation for reliability of supply of light and heat, and there have been many occasions when this continuity of service has been made possible only by the manufacture of carburetted water gas. Also, the important part played by carburetted water gas in ensuring uniformity of quality of the gas supplied will be readily acknowledged. It enabled us to control and stabilize the coke market and it robbed our peak load of many of its terrors. It is not, however, our point here to list the advantages of C.W.G. They were dealt with by Dr. Glasgow, recognized as one of the greatest living authorities on the subject—and, as Mr. Henry Woodall remarked in proposing a vote of thanks to the Lecturer, an original thinker with a world-wide knowledge of gas manufacture and a capacity for logical and clear expression.

We feel quite sure that gas engineers throughout the country will give the closest study to Dr. Glasgow's thesis, which is the *tactical* use of auxiliary carburetted water gas, to co-ordinate the unique advantages of cheap peak-load gas production and economic control of coke production. The Lecture is based on the Treatise by Humphreys & Glasgow which was published in the "Journal" in August, 1933, subsequent discussion of which has not modified Dr. Glasgow's views on the application of carburetted water gas on an orderly, determined plan, as distinct from its haphazard use. No good purpose would be served by amplifying our comments in the "Journal" for Aug. 23 and Aug. 30, 1933, on the main conclusions arrived at by the Author, but we would call attention to Dr. Glasgow's contention in the present Lecture that cheaper town gas cannot be achieved by reducing its present quality, because capital and maintenance charges are measured by quantity and not by quality—by volume and not by therm. Reduction in quality, he maintains, correspondingly increases the capital and maintenance costs per therm—of manufacture, storage, distribution, and utilization. Admixture of oil gas with coke gas, in the form of auxiliary carburetted water gas, is the only practicable way to maintain the quality and the peak load quantity of town gas. Moreover, carburetted water gas has a "hidden" advantage over coal gas, in its smaller difference between gross and net calorific values. Carburetted water gas of 489 B.Th.U. is the actual equivalent of coal gas of 500 B.Th.U. Again, during the five-year period 1929-33, less than 1¼% of oil gas distributed in the town gas supplied in Great Britain had the effect of eliminating from the market 9,370,000 tons of coke.

The Gas Oil Duty

We do not presume to argue these points with Dr. Glasgow, but we consider that the Industry owes him a debt of gratitude for setting out so clearly the case for carburetted water gas. It is there for every individual gas engineer to apply, when the occasion arises, to his own circumstances, and it is safe to say that Dr. Glasgow's Lecture will stand as the last word on the subject until he himself produces a later edition. Which brings us to his final contention—that, oil gas being essential, national interests would be far better served through the Gas Industry by the remission of the gas oil duty than through the Exchequer by its collection. Dr. Glasgow realises, of course, the benefit *on balance* to the Gas Industry of the import duty on this class of oil, but he puts up, with his customary thoroughness and obviously after a very great deal of exploration, a case for the exclusion from it of the proportion used exclusively for gas making. It is a small proportion of the whole, but not of small moment to the Gas Industry, and, though it is difficult to add strength to Dr. Glasgow's six points, there is one more which may perhaps be considered. Those who do not see eye to eye with him on the advisability of pressing the remission claim on behalf of

the Industry maintain that it is dangerous to try to tamper with a particular portion of any particular duty. Is this argument weakened in any way by the levy of 8d. a gallon on fuel oil for use in diesel engines which is to come into force next August? A duty on *a particular use* of imported oil. Can this be claimed as a precedent for the remission on a particular use which we should all like to see?

Building-Up Sales

As we have emphasized before, the establishing and maintenance of personal contact with the consumer and all connected directly or indirectly with gas sales is a vital factor if we are to develop sales to the extent they undoubtedly can be increased. We must establish good relationships with prepayment consumer and ordinary consumer alike, and with both small scale and large commercial and industrial consumers. We must also keep closely in touch with architects and builders, industrialists generally, and, through the various social organizations, and so on, with the widest possible public. For which reason we were glad that at the Institution meeting the subject received proper attention and was discussed by the various speakers from several angles. It was brought to the fore by Mr. Chandler in his Paper dealing with the development of gas sales, with particular reference to the activities in this direction of his own Company, which enjoys a well merited reputation for keen salesmanship and a capacity for keeping in touch with its consumers and also with the times. The Tottenham and District Gas Company is, of course, large, and most effectively planned on the sales side, but for undertakings of any size there is a great deal to be learned from Mr. Chandler's contribution and there is no question that many of the methods employed at Tottenham, which experience has shown to be so effective, can with modification be generally employed to the advantage of the Gas Industry as a whole.

Organized Canvassing

In common with ourselves, Mr. Chandler believes that this personal contact is essential if we are to hold and extend our business. He acknowledges that this relationship is being fostered by many undertakings but regrets the absence of any definite policy, in consequence of which many consumers are neglected. We thoroughly agree with him that a properly organized scheme can be applied by any undertaking, whatever its size. Its application is not a difficult matter, and there is ample evidence that the money spent in this direction is low in proportion to the results obtained. Money so expended is a first-rate investment. Mr. Chandler asks for an intensive canvassing campaign throughout the Industry, and explains that Tottenham's experience is that a system of payment based on an adequate wage *plus* a reasonable amount of commission will produce most fruitful results. Payment of commission is in many quarters regarded with disfavour. But, provided the sales policy in this regard carries with it proper supervision, an adequate wage irrespective of commission is paid, and those engaged in the work have the " service first and last " idea always in mind, there is a great deal to be said for the plan which has proved so successful at Tottenham. At all costs, of course, we must avoid so-called " high-pressure " salesmanship—pestering the gas consumer to install appliances and looking upon their sale as the be-all and end-all of the transaction. The basis of the scheme should be to ascertain that every consumer on the district is satisfied with the service rendered by his supply undertaking and is made acquainted with what modern gas service and modern gas equipment really mean.

No such scheme as that dealt with by Mr. Chandler can hope to achieve success unless the personnel employed is adequately trained, and in this regard also many useful suggestions were put forward by the Author in his Paper and by those who contributed to the discussion. As Mr. Chandler states, the almost daily introduction of appliances devised for the more efficient use of gas, often involving new devices and novel designs, makes it necessary that those whose business it is to introduce them to the consumer should know all about their construction, performance, and suitability. For which reason undertakings must take steps to keep their sales staffs fully informed on new developments. Periodical attendance of the staff at sales lectures and classes is most desirable, and Mr. Chandler speaks highly of the Domestic Gas Salesmanship Course of the British Commercial Gas Association, which has been taken up enthusiastically at Tottenham, where the need for trained personnel on the sales side has long been recognized. The author outlines this Company's training scheme, which has the merit of simplicity of organization. Its application to small undertakings, with perhaps minor modifications, is quite feasible.

The Prepayment Consumer

The point we would make is that personal contact is not just a question of saying " How do you do? " to the consumer. It is the personal contact which promotes sales which we have in mind. After all, as was mentioned in the discussion at the meeting to which we refer, every electrical contractor is a salesman for the electrical undertaking, because he has to live by the sale of his wiring and appliances, and we should visualize this aspect when we talk of personal representation in our own areas of supply. There is another point about personal contact which we would emphasize here, and that is that if a consumer has been neglected in one area of supply and moves to another area he is prejudiced against gas, and the new undertaking, however efficiently organized, is handicapped at the start. Every undertaking has a duty to the Industry generally—a fact, however, which is all too frequently ignored. Another point we would stress is the need for giving equal attention to the prepayment consumer as to the ordinary consumer, and equal facilities in the purchase of appliances. It should be borne in mind that prepayment consumers outnumber ordinary consumers by more than 2,000,000.

Turning to the industrial sale of gas, here again personal contact is of the utmost importance, and there can be no doubt that much of the success which has attended the establishment of the Industrial Development Centres is traceable to the good understanding and relationship which they have fostered between undertakings and industrial consumers. Already there are several instances in which this has led to increase of business and great possibilities. Such satisfactory relationships should be passed on. Here again, in regard to migration of works, gas undertakings have a large responsibility in seeing that they continue any good work which has been done by those undertakings who originally supplied the firms with gas and gas service.

Of course, contact with architects and builders is especially important, and in 1930 a Special Building Development Department was established by the Tottenham Company for the particular purpose of dealing with new estates. Mr. Chandler's account of its functions

and its accomplishments is valuable. In regard to demonstration show houses a most interesting plan, which we commend, was mentioned by Colonel Carr. The scheme of the Stretford Gas Undertaking is to purchase a demonstration house on an estate and to sell it after the estate has been developed. " If," said Colonel Carr, " we are to demonstrate to the public as we feel we should do, and if we are to devote all our energies in that demonstration house to sell gas, it is desirable that the house should belong to the gas undertaking." The salesman installed at the house can be on the lookout on the estate, and he is there for the sole purpose of demonstrating the uses of gas. His task is made much easier than if he were installed in a builders' demonstration house. Moreover, it is really quite a cheap means of advertising. Assuming the price of the house is £400 or £500, when the estate is fully developed the house can be sold even at a slight loss, which should not be more than £40 or £50. It is an extremely efficient way of advertising gas and bringing in new business.

Tar and Tar Products

In his Address as Chairman of the Auxiliary Section of the North of England Gas Managers' Association, which he delivered at a meeting on Friday last, Mr. S. W. A. Wikner, of Newcastle-upon-Tyne, has packed a very great deal of information—and he has accomplished this in commendably small compass. The author has had a long and wide experience of tar distilling, and the opinions he expresses and the suggestions he makes in his Address, which is published in our issue to-day, demand close attention.

In the " JOURNAL " for April 24 last we suggested that the Gas Industry should take steps to benefit from the duty of 8d. a gallon which is to be levied, as from August next, on imported fuel oil for use in diesel-engined road vehicles. We pointed to the reward if, by organized research, creosote and tar oils were made into a satisfactory diesel engine fuel. We discussed the addition of dopes, mentioning that the new duty alters the outlook as to the practicability of their use, and we also spoke of modification of existing methods of distilling tar, and the potentialities of hydrogenation or partial hydrogenation. Consequently we find Mr. Wikner's remarks on the possibilities of using creosote as a fuel in the compression-ignition engine highly interesting, and his enthusiastic agreement with our views gratifying. He does not blink the drawbacks to creosote, but he regards the solution of the difficulties as being by no means insuperable. One difficulty is to ensure the complete fluidity of creosote at ordinary temperatures, the deposition of naphthalene and other solids, good enough in themselves, being sure to cause trouble. But the requisite fluidity can easily be obtained by mixing with the required proportion of petroleum oils, a precedent for which may be found in the mixing of benzole and petrol in National Benzole Mixture. He regards the prospect as " most intriguing," and asks that no time should be lost in carrying out the research necessary to solve the problems involved—a plea which we made in April last, when we suggested that our Industry should join in common counsel with tar distillers and diesel engine manufacturers and users.

Great interest attaches to Mr. Wikner's observations on road tar. At present more than half the tar produced in this country is being used on the roads, which is encouraging and should spur us on to further efforts to increase its use for this purpose and displace imported bitumen. Mr. Wikner queries whether we are going about the matter in the right way—whether, in fact, straight distillation of tar is sufficient to ensure the best road material. " Straight run " tar can, of course, be made to comply with the specification of the British Standards Institution, but the author obviously regards these specifications as insufficiently stringent. The specific gravity of a tar for road purposes, he suggests, should be as near 1·20 as possible and certainly not below 1·18. The requirements of the B.S. Specification for Tar No. 3, which most closely approximates the standard advised by Mr. Wikner, are a minimum specific gravity of 1·16 and a maximum of 1·26. Again, the tar advised must not contain more than 1·5% of tar acids or more than 2% of naphthalene, both of which constituents should be as low as possible in amount. By contrast, the figures for B.S. Tar No. 3 are 2% and 3%.

" Newcastle " Road Tar

Now tars of the quality advocated by Mr. Wikner cannot be produced by straight distillation, but must be distilled nearly to pitch to remove the oils bearing tar acids and naphthalene, the residue being cut back with selected oils from which these products have been removed. This is the practice at Newcastle, and Mr. Wikner maintains that the tar so made does gives better results in practice, not only because of the lower content of naphthalene and tar acids, but because of the alteration which occurs during the over-distillation necessary to produce the tar. His statement is based on experience extending over a period of seven years.

Several other points of practical importance in connection with tar distilling are dealt with by Mr. Wikner. He asks the tar producer to pay closer attention to the water content of the product he passes on to the distiller, discusses the relative advantages and disadvantages of intermittent and continuous distillation of tar, and mentions the process of preliminary dehydration of tar by steam which is in operation at Newcastle. On all these matters his comments are valuable and will be widely welcomed, as also will his remarks on the inhibitor process for refining benzole, which in his particular circumstances gives an increase in yield of about 5% of motor benzole with a saving in cost of acid. Altogether the process is a notable advance, though it has not simplified benzole refining. " In our experience," states Mr. Wikner, " the refining, as regards control of quality, has become more complicated." He says this without intending to disparage the manifold benefits which accrue from the process, but in general he believes that it involves a greater measure of supervision than refining by acid washing. Finally, we should specially emphasize Mr. Wikner's insistence that in the interests of the Industry the good reputation of benzole as a motor fuel must be maintained. Disposal of benzole in a crude or insufficiently refined state for use in motors will undoubtedly be a disservice to the Industry.

Coal Industry Moves

THE question of coal was again prominently before Parliament last week, and once again the voice of the Public Utilities has not been silent.

The amendment of the Central Coal Mines scheme which was discussed in the House of Lords at the beginning of the month was certainly not more important than the drastic and radical amendment of the Lancashire and Cheshire District (Coal Mines) Scheme which came before the Second Chamber last Thursday night. It was unfortunate that a matter so vital to the coal industry and to the many industries which depend upon coal should be discussed at a late hour of the evening and immediately after such a sensational debate as that

which took place on the second reading of the Government of India Bill.

As amended, the Lancashire and Cheshire Scheme will differ materially from other District Coal Schemes in that it constitutes the District Executive Board the sole selling agency of the district; the Board may purchase the coal of the owners of the pit and may prohibit the supply of coal by the owners otherwise than in accordance with the orders of the Board.

Lord Mount Temple, who is President of the Conjoint Conference of Public Utility Associations, again expressed the fears of the public utilities with regard to a scheme of this character, and stated that "the gist of the Order is that the coalowners of Lancashire and Yorkshire should in effect be allowed to charge what price they like for coal sold to public utilities, and also direct the public utilities to buy from the appropriate collieries." He asked therefore that the representative of the Government should state that the Order was an experimental order, and that no new Order should be made until it is seen how this Order works out.

The reply on behalf of the Government was made by the Lord Privy Seal, Lord Londonderry, who gave an assurance that it was not the intention that unreasonably high prices should be charged against consumers. The scheme, he affirmed, was of a purely experimental character and would be watched most jealously by the Minister of Mines not only in the interest of the coal industry but also in that of the consumer.

At the conclusion of his speech, Lord Londonderry was pressed by Lord Mount Temple to give an assurance that after some experience of the working of the scheme, the Minister of Mines or the President of the Board of Trade should consult with the public utility undertakers so that any grievance which might have been experienced by the working of the scheme could be further investigated. Lord Londonderry, while expressing the view that no such grievances would be experienced, stated that the Minister of Mines would have the matter under his constant investigation, and that he had no doubt that he would have an opportunity of consulting with the public utilities as to whether any of their fears had been realized.

Although this assurance on behalf of the Government certainly gives some measure of comfort and will no doubt have a beneficial effect upon the Mines Department, it does not entirely allay fears caused by the avowed intention of the mineowners to raise the price of coal to public utilities. We have never concealed our distrust of the whole policy of the Coal Mines Act, 1930, which is to place in the hands of the coalowners weapons, blessed by Parliament, with which to strike at their competitors. The question is given a somewhat Gilbertian flavour by reason of the fact that these very competitors are also the coal industry's best customers, and, indeed, the only persons who can provide the public with heat and power in their most modern and convenient form.

The affairs of the coal industry can never be placed upon an entirely satisfactory basis until that industry comes to regard gas and electricity as its allies rather than as its competitors.

Personal

Jubilee Medal Awards—G.L.C. Ambulance Men Honoured.

The Gas Light and Coke Company has three Divisions in the St. John Ambulance Brigade, and four of their members have just been awarded the King's Silver Jubilee Medal in recognition of their services during the past 25 years. It is probably a unique record to find four of these coveted medals being given to members of one company.

Before workers can join the St. John Ambulance Brigade they must first of all have a first-aid certificate, and after that they have to pass an examination every year. The Company's Jubilee Medal holders have had impressive careers.

Mr. W. A. ROUST, an inspector at the Gas Light and Coke Company's Goswell Road office, is one of the four who has been honoured with the Jubilee Medal. He obtained his first-aid certificate in 1908 and joined the Hampstead Division in 1909. Four years later he was made a Corporal. At the beginning of the War he joined the R.A.M.C. and was promoted to Sergeant. He became Sergeant in the St. John Brigade in 1920, and later was transferred to the Horseferry Division. He passed to Ambulance Officer and finally to District Officer in 1933. He holds the Brigade Service Medal with two bars for 25 years' service. The Jubilee Medal completes a record of which anyone might be proud.

Mr. J. E. TAYLOR is Ambulance Station Attendant at Southall. He joined the Brentford Division of the Brigade in 1908, formed the Southall branch the next year, and was promoted in 1914 to Staff Sergeant. He joined the R.A.M.C. at the beginning of the War, and in 1921 came to the Southall Works as Ambulance Attendant. In 1925 he became Superintendent of the Southall Division. He holds the Brigade Service Medal with two bars for 25 years' service. Mr. Taylor is still attached to the R.A.M.C. and attends a military hospital for training each year.

Mr. BERTRAM ALLAN METCALFE is employed at the Beckton Works, and joined the Ambulance Brigade in 1915. In 1930 after a number of promotions he became Staff Sergeant, and received the Brigade Service Medal.

Mr. A. J. GRAY, of the Products Works at Beckton, joined the Brigade in 1901. He performed excellent work at the great Silvertown explosion in January, 1917, and in 1924 was invested by H.M. the King at Buckingham Palace as Honorary Serving Brother of the Order of St. John. He also holds the King Edward VII. Coronation Medal—this was the first public duty in London of the Beckton Division. He has the Brigade Service Medal with three bars for 30 years' service.

* * *

We learn with great pleasure that Mr. CHARLES F. BLINCOE, Engineer and Manager of the Middlesbrough Corporation Gas Department, has received a Silver Jubilee Medal.

* * *

Mr. DOUGLAS L. COPP, A.M.Inst.C.E., formerly Assistant Engineer and Manager to the Exeter Gaslight and Coke Company, has been appointed to a position on the Staff of the South Metropolitan Gas Company.

* * *

Mr. JOHN WALKER ROBERTS, Engineer, Manager, and Secretary to the Ripon Corporation Gas Department, was married on June 18, at Tanfield Parish Church, near Ripon, to Josephine Mary, younger daughter of Mr. and Mrs. W. G. Dawson, of Bingley.

* * *

We learn that Mr. L. G. HUMPHRYS, Engineer and Manager of the Borough of Bexhill Gas Department, has recently been transferred from the class of Associate Member to Full Membership of the Institution of Mechanical Engineers.

Forthcoming Engagements

June.

28.—WAVERLEY ASSOCIATION.—Annual Meeting in Edinburgh.

July.

5.—MANCHESTER DISTRICT ASSOCIATION.—Meeting at Cleckheaton.

5.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—County Meeting at Brighton.

6.—WESTERN JUNIOR ASSOCIATION.—Summer Meeting at Weymouth.

9.—N.G.C.—Meeting of the Central Executive Board.

17.—B.C.G.A.—Executive Committee Meeting, 11 a.m.; General Committee, 2.30 p.m.

18.—S.B.G.I.—Council Meeting at 56, Victoria Street, S.W. 1, 2.30 p.m.

Sept.

12.—NORTH BRITISH ASSOCIATION.—Annual Meeting at St. Andrews.

Correspondence

Gas and Electricity—A Comparison

SIR,—Your observer's review of the proceedings of the National Electrical Convention held at Bournemouth concurrently with the Annual Meeting of The Institution of Gas Engineers is extremely interesting and offers many points of practical interest.

From a perusal of this review it is obvious that the "panacea for all evil" exists only in the fertile imagination of the political prophet who is in search of a seat in the "Gas" House.

Apparently matters of contention cannot be faced with the sincere desire for elucidation so essential to achievement, mainly due to the realization that political interference, which once seemed such a blessing, is having the effect of a boomerang. The blessing has become a curse so entangled in red tape that the struggle for freedom only results in the tightening of the red tape knots.

Many hard words have been said by the Gas Industry regarding this Government propaganda creating unfair competition with a rival industry, but they can now partake of crumbs of comfort. There is no question of rights once held being withdrawn, but rights long due not as yet acquired. There still remains that "hope eternal" that these will eventually be obtained.

In connection with two-part tariffs, the Gas Industry has moved slowly but cautiously. The electrical rateable value tariff originally stated to be such an "unqualified" success has now proved "qualified."

It seems a strange anomaly that, though the installation of electrical appliances for cooking and heating is within the range of the tenants of municipal houses who are on a low wage, and within the reach of the rich who can afford to pay cash, yet the middle class who are in the preponderance are financially barred from installing these. While it is a prevailing feeling in the Gas Industry that the cost of gas appliances is on the high side, yet there is the consolation that these are more likely to be reduced than increased.

Our electrical friends, the cost of whose appliances is already considerably higher, have no such consolation, as the manufacturers contend that the margin of profit to cover research is far too small. This is an ominous statement and very clearly delineates "the writing on the wall."

The conclusions to be drawn are that at the present time the Gas Industry has much for which to be thankful. It is free from political interference. It still has hopes of eventually obtaining that further freedom from antiquated legislation which it so ardently desires. It has a united front and, with enthusiasm which is contagious, is undoubtedly going through a course of rejuvenation. If it continues to count its own blessings with less attention to those of its competitor, then continued success is a foregone corollary.

On present lines of progress the eventual realization of gas being generally applied for heating and cooking is more likely of fruition than electricity when on the lines which that Industry is at present pursuing.

The British Gas Federation launched in calm waters is floating placidly, but the National Electrical Convention, while successfully launched on a stormy sea, still has a rough passage before it and would probably be a bad risk at Lloyds.

Yours, &c.,
A. C. TAYLOR.

3, Old Newbridge Hill, Bath,
June 22, 1935.

News in Brief

142 out of 178 Tenants in the East Saltney Council houses have petitioned the Hawarden Rural Council to allow the Chester United Gas Company to give a gas service to their houses.

Application to Borrow £5,000 for the extension of mains, £1,000 for the extension of services, and £1,000 for meters in connection with their Gas Undertaking is to be made by the Chorley Town Council.

The Free State Government Has Sanctioned the borrowing by Limerick Corporation of a sum of £14,000 for Gas-Works improvement. The plant includes a new gasholder and the erection of vertical retorts.

To Cope with the Continued Increase in business, extensions to the Works of the Foster Instrument Company, Letchworth, Herts., are now in course of erection, and will provide an additional 40% manufacturing space within the next few weeks.

The Sale of Gas in Johnstone during the last year was a record, the sale of gas cookers also being higher than ever before. A reduction in price of 2d. per 1,000 cu.ft., we learn from a local correspondent, is expected for prepayment consumers.

"**Ideas for Home Lovers**" is the title of an attractive little folder recently issued by the Newcastle-upon-Tyne and Gateshead Gas Company to call attention to two model houses which have been completely equipped with gas appliances by the Company.

Ardrossan Gasholder Decision.—Ardrossan Town Council has decided, by 4 votes to 3, to leave over for a year the question of installing a new holder, for which tenders had been invited, the most favourable being that of Messrs. Henry Balfour & Co., Ltd., Leven.

Among the New Companies Registered in Scotland last week is the Castle-Douglas Gas Company, Commercial Bank Buildings, 84, King Street, Castle-Douglas, to take over the Works and Property of the Castle-Douglas Gas Light Company. Capital, £4,450 in 89,000 shares of 1s. each.

The Retention of Gas for Public Lighting has been decided upon by the Inverurie Town Council. At a special meeting on June 20, quotations for street lighting were submitted by the Grampian Electricity Supply Company and by Inverurie Gas Company, Ltd., and it was decided to adhere to gas.

Variation of Declared Calorific Value.—The Earby and Thornton Gas and Lighting Company, Ltd., in compliance with the Gas Regulation Act, 1920, give notice that as from Oct. 1, 1935, the calorific value of the gas which they intend to supply will be altered from 475 to 450 B.Th.U. per cu.ft.

The Bristol Gas Company recently asked for £179,500 of 5% maximum General Capital Stock at £118. The issue was only advertised locally; the lists opened at 10 a.m. on Tuesday last, and closed five minutes later. Well over £1,000,000 was applied for—indicative of the public's confidence in the Industry.

New Cheltenham Issue.—The Cheltenham and District Gas Company, which is one of the supply undertakings controlled by the Severn Valley Gas Corporation, Ltd., announces that an issue of £100,000 3½% Redeemable Debenture Stock of the Company has been privately placed at £98% net. The stock is redeemable at par on July 1, 1965.

Falmouth's Latest Housing Scheme consists of 84 houses adjacent to the electricity works. The scheme is now almost completed, 54 of the houses being already occupied. Mr. H. H. Hoare, Engineer and Manager of the Falmouth Gas Company, informs us that all the 517 Council houses in that district, which includes those mentioned, are supplied with gas for all purposes, and not one with electricity.

The Net Profit of the Societa Italiana per il Gas (Italgas), of Milan, as shown by the report for the last financial year, amounts to 21,610,000 lire as compared with 13,680,000 lire in 1933. The dividend is being raised from 5% to 7%. The sales of gas during the twelve months amounted to 7,155,310,000 cu.ft. as compared with only 7,120,010,000 cu.ft. in the preceding twelve months.

The Centenary Meeting of the Bideford Gas and Coke Company, Ltd., was held in the Town Hall on Thursday, May 30. Mr. M. J. Durant, Chairman of the Directors, presided, and it was decided that a final dividend of 8% on the original shares and 6½% on the additional shares, making for the whole year 14½% per annum on the former shares and 11½% per annum on the latter. Mr. A. W. Bennett was elected to the Board to fill the vacancy caused by the death of Mr. G. H. Cork, who served the Board for 21 years. The profit on the Undertaking for the past year is £4,941.

A Bulk Supply to the Earby and Thornton Gas and Lighting Company, Ltd., was approved on June 5 by the Barnoldswick Urban District Council. The Company, who are at present manufacturing at their Earby Works, will retain their existing powers within their own district. The new main will be laid from Salterforth, where the Barnoldswick Council have supplied gas for many years. It is understood that the agreement will prove particularly beneficial to the Earby district consumers.

Glasgow Chemical Section's Excellent Year.—It was reported on June 21 by Bailie John Young, Convener of the Glasgow Corporation Gas Committee, that for the year ended May 31 the Chemical Section of the Gas Department showed a surplus of £51,100. This surplus, the best for the past three years, is attributed to the general improvement in industry. Reconstruction of plant has also increased the efficiency of the Section and made for more economical working, while the reduction of 12s. 6d. per ton in the price of acid brought increased sales. Bailie Young stated that other changes are in progress and he anticipated next year's surplus would be greater.

At the Official Opening of the Bo'ness Gas Light Company's reconstructed showroom in South Street, ex-Provost Simpson (Chairman of the Company) said that certain undertakings in West Lothian had been sold by the shareholders. He regarded this as something that would be regretted. They had had the opportunity of selling out in Bo'ness also, but they had refused to sell. The Town Council should have taken the opportunity offered to them 14 years ago to purchase the undertaking. Had they done so, they would have had to-day a very valuable asset. The main lighting of the showroom is by Sugg's Bon Marché lamps. Window lights are automatically lighted and extinguished by clock control.

Montrose and the Caledonian Gas Corporation, Ltd.—In Montrose Guild Hall on June 5, states a local correspondent, over 60 shareholders of Montrose Gas Company, Ltd., met to discuss an offer made for the shares of the Company by the Caledonian Gas Corporation, Ltd. The following resolution was unanimously carried at the meeting: "That the members of Montrose Gas Company, Ltd., present or represented at this meeting, are of opinion that it is not in the best interests of the shareholders of the Company or of the Company's customers to accept the offer made for the shares by the Caledonian Gas Corporation, Ltd., and they recommend absent shareholders not to accept the offer." Copies of the resolution are being sent to all shareholders.

Remarkable Success attended this year's cookery competitions conducted by the Alliance and Dublin Consumers' Gas Company which were recently concluded. At the distribution of the Awards, which took place in the Company's demonstration theatre in D'Olier Street, Mr. Joseph X. Murphy, a Director, who presided, revealed that the schools participating this year numbered 42 as against 38 last year, while the prizewinners totalled 448 against 440. The number of entries would, the Chairman said, have been still much greater but for the prolonged tram and 'bus strike. The oral examination showed a great improvement on former years, but the knowledge of the pupils was hampered by the insufficient number of cookers installed in the schools, which, of course, was a matter for the consideration of the school authorities only.

Manchester and District Junior Gas Association

Visit to Wallasey

The Annual Ladies' Day of the Manchester and District Junior Gas Association on June 15 showed a record attendance, there being some 189 present.

The main party met at Liverpool landing stage, prior to crossing by boat to Seacombe, where five motor 'buses were waiting to convey them to the Wallasey Gas-Works.

After inspecting the compressed coal gas machinery plant, motor vehicles, and bore hole pumps, afternoon tea was served.

Leaving the works, the visitors were taken to Seaview Road Water Works, to inspect the pump and wells, and from there they visited the Gorsehill Reservoir. Having viewed the fine new "Derby" bathing pool, which was very much admired, the party were taken round the district of New Brighton, finally arriving at New Brighton Bathing Pool, where high tea was served at the invitation of the Gas Committee in the Bathing Pool Café.

The PRESIDENT (Mr. J. Carr) proposed a vote of thanks to the Wallasey Gas Committee for the visit and hospitality, while Mrs. J. Carr thanked the ladies for their presence and support.

Amalgamation and Grouping

Associated Gas and Water Undertaking, Ltd., and Alresford.

Associated Gas and Water Undertakings, Ltd., inform us that they have recently acquired the controlling interest in the Alresford (Hants.) Gas Company, Ltd.

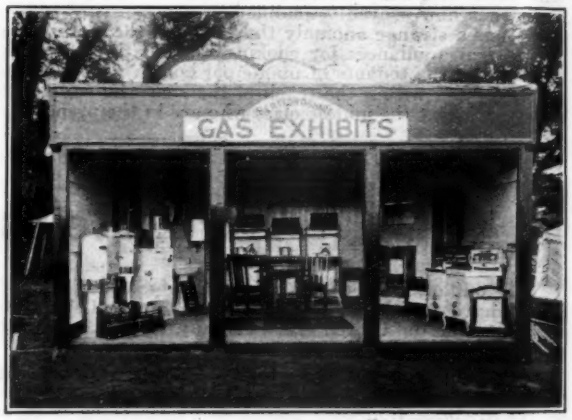
Caledonian Gas Corporation and Montrose.

The Caledonian Gas Corporation, Ltd., Edinburgh, who failed to secure the requisite 51% of shareholders willing to sell their holdings in Montrose Gas Company, Ltd., have signified in a circular their willingness to abide by their offer to those who expressed their willingness to sell.

Gas at the Hertfordshire County Show

Our photograph shows the Exhibit of the Hertfordshire Gas Exhibit Committee at the Hertfordshire Show in Hatfield Park on June 20. The Committee consist of Mr. S. B. Chandler (Tottenham), Chairman, Mr. J. Rust (Barnet), Mr. E. W. Swan (Hitchin), Mr. F. G. Wells (Watford), and Mr. C. S. Knowles (Hatfield), Secretary.

By arrangement with the Watford and St. Albans Gas Company, the Committee secured the use of a new portable showroom, which can be adapted to make an admirable stand for exhibition purposes. Although the Show ground is situated nearly a mile from the nearest gas mains, it was possible, by use of compressed gas in cylinders, to



demonstrate various types of hot water apparatus; a gas fire with automatic lighting attachment and set in a "Marblate" surround; a gas cooker and a "Freezolux" refrigerator. The Exhibit was awarded first prize as the most attractive covered stand, and much useful propaganda work was accomplished among the visitors to the Show.

The portable showroom, which is an entirely new feature, was constructed under the supervision of Mr. C. S. Knowles, the District Manager in the Hatfield area of the Watford and St. Albans Gas Company. It is possible to have any of the sides, back, or front open or closed as required, while it may be dismantled, transported within the area, and erected in one day. It is hoped to make much use of the Showroom in the country districts.

Still Cheaper Gas

New Low Record at Dumbarton

Gas is now being supplied at less than the low pre-war rates to the consumers of Dumbarton. The Gas Committee have resolved to adopt the following scale of block charges to domestic and industrial consumers:

	Per 1,000 Cu.Ft.			Price per Therm.
	s.	d.		d.
For the first 7,000 cu.ft. per quarter . .	2	6	or	7·06
For the remainder and up to 50,000 cu.ft. per quarter	1	8	,,	4·70
For the remainder and up to 100,000 cu.ft. per quarter	1	7	,,	4·47
For the remainder and up to 250,000 cu.ft. per quarter	1	6	,,	4·23

In respect of prepayment consumers the above block quantities to apply, with the additional charge of 3d. on each block.

South Metropolitan Gas Company

Co-partnership Festival at South Shields

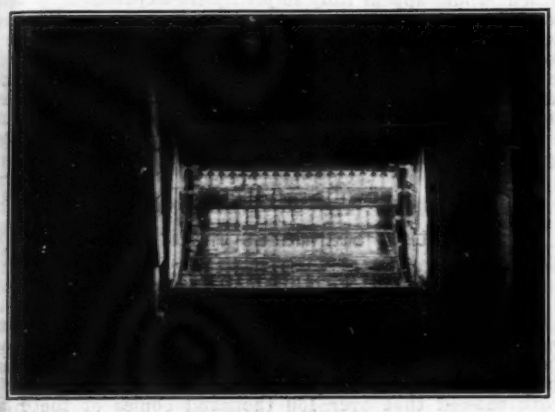
The Seventh Annual Co-partnership Festival for the Employees of the Coal and Shipping Department of the South Metropolitan Gas Company was held on Saturday, June 22, at South Shields.

Over 500 employees, their wives and children were entertained at tea and enjoyed a lengthy and varied programme of sports and amusements.

The guests from London, Mr. V. Hewes (Co-partnership Secretary and Employees' Director), Mr. J. B. C. Pinks (Employees' Director), Mr. A. S. Holden (Assistant Secretary), and Mr. A. Lee (Chairman of the Elected Representatives on the Co-partnership Committee) were welcomed to the Festival by Major F. J. Bywater, head of the Coal and Shipping Department of the Company. The President of the Company, Dr. Charles Carpenter, C.B.E., was unable to be present but a message from him was read to the company at tea.

During the afternoon and evening the Heworth Colliery Band played selections, and at the conclusion of the Sports Mrs. F. J. Bywater presented the Prizes to the successful competitors.

Enterprise in Barbados



The "home-made" Unit in Action.

Barbados saw its first floodlighting during the Jubilee celebrations thanks to the enterprise of Mr. J. W. Brown, Engineer and General Manager of the Barbados Gas Company, Ltd. Beset with difficulties of importation of units, and costs that would have caused many less enthusiastic men to abandon any floodlighting scheme, Mr. Brown set himself the task of building his own units with a few strips from the sheeting of a recently demolished gasholder, some mirrors from 25-year-old reflectors which were mounted on strips and made adjustable, a length of 1½ in. gas tubing, and whatever odd material he had to hand for gas and air controls. Although the work was hurriedly undertaken, each unit functioned perfectly and had an approximate output of 5,000 candle power.

No "Superman" for Manchester

By the decisive majority of 70 votes to 14 the Manchester City Council has rejected what had come to be known as the gas "superman" scheme, though it is a strange commentary on the workings of our Industry that "supermen" should be expected to be available to over-ride the present chief officers at a salary of £2,250. There has been much talk of the report of the Special Committee of Enquiry which recommended unified control, at the salary mentioned, instead of the present system, but in the upshot the Council decided that the existing Heads themselves are supermen, and unstinted praise of the Chief Engineer and the Commercial Manager was forthcoming from several speakers. The enormous improvement in the financial position of the Undertaking in recent years was pointed out in Council, and impressive figures for the Sales Department were quoted. Unfortunately, as a member of the Gas Committee pointed out in a subsequent interview, these attacks on officials cannot be answered in Council by the officials themselves, and their many friends in the Industry will be delighted that the position of the chief officials at Manchester has been so completely vindicated.

Athletic and Social

Hartlepool Company's Football Success.

The Hartlepool Gas and Water Company's works football team has had a very successful season, having been victorious in five Cup Competitions for which they entered. Such a record, though not unique in football generally, constitutes a remarkable achievement for a gas-works

team. Our photograph shows the successful team with their trophies, and, in addition to the players, includes Mr. J. R. Bradshaw (President of the Football Club and Engineer, Manager, and Secretary of the Company), Mr. F. J. Webster (Vice-President), Mr. L. M. Weldon (Hon. Treasurer), and Mr. S. A. Sinden (Hon. Secretary).

Ipswich Long-Service Awards.

At a meeting of Co-partners of the Ipswich Gas Light Company in a marquee at Holywells Park, Ipswich, on Tuesday, June 18, about 98 employees and pensioners with 25 years' or more service to their credit were the recipients of long-service awards.

A group of those present at the presentation at Ipswich.

The company, which numbered over 300, and included members of the Felixstowe and Woodbridge staffs, and about forty pensioners, was presided over by Mr. H. Woodall (Chairman and Managing Director), who was supported by the Mayor of Ipswich (Mr. G. A. Mallett, who is Secretary to the Company), Messrs. P. W. Cobbold, H. St. G. Cobbold, Frank Prentice, and A. J. Haward (Directors), and heads of departments.

Following a high tea given by the Directors, the Chairman observed that this year saw the coming-of-age of their co-partnership fund, which was established in 1914. Collectively, the Co-partners owned £18,000 in the Undertaking, the fund having increased from £4,507 in the last 18 years. The allied superannuation fund had increased in the same period from just over £20,000 to about £85,000. Moreover, the Company, which was now 114 years old, was in a stronger and sounder position than ever before, and they could hope for even better results in the future.

The toast of "The Staff" was given by Mr. Philip Cobbold, and responded to by the Mayor and Mr. W. G. A. Gardiner.

Mr. Prentice gave the toast of "The Chairman," which was received with musical honours. Mr. Woodall briefly replied.

The British Gas Light Company

Successful Cookery Demonstrations

Recently the British Gas Light Company arranged cookery demonstrations in four districts in North Wales. The first of the series was held in Bagillt, the second in Greenfield, the third in Flint, and the last in Ruthin. This latter series was arranged in conjunction with the Ruthin Gas Company.

In spite of the inclement weather experienced during the demonstrations, residents from these districts attended in full force, and in Flint the hall was crowded out for both of the sessions during the week.

The demonstrations were given twice daily by Miss M. Ball, of the Radiation Research Kitchen, and popular dishes of the present day were cooked in a "New World" cooker. Complete dinners were prepared and cooked without attention and without opening the oven door.

Cake-baking competitions were arranged with well chosen prizes. The excellent arrangements made by the Engineer and Manager of the Holywell and Flint Station of the British Gas Light Company, Mr. R. S. P. Prince, undoubtedly ensured the success of the lectures and gas exhibitions in all four districts.

Association of Public Lighting Engineers

New Members

At the last Council meeting of the Association of Public Lighting Engineers the following, among others, were admitted to Membership:

Ordinary Membership.

B. A. Carpenter, Engineer and Secretary, Sheppy Gas Company.
H. D. Davies, Engineer and Manager, Herne Bay Gas Company.
W. A. Howie, Engineer and Manager, Gravesend and Milton Gas Light Company.
L. J. Langford, Engineer and Manager, Tunbridge Wells Gas Company.
S. L. Wright, Engineer and Manager, Sittingbourne District Gas Company.
H. Wyver, Engineer and Manager, Whitstable Gas and Coke Company.

Junior Membership.

H. Jack, Deputy Gas Engineer, Southport.

Associateship.

K. F. Sawyer, Chemist, Gas Light and Coke Company, Watson House.
F. C. Smith, Chief Assistant to Chief Technical Officer, Gas Light and Coke Company, Watson House.

It was decided that Mr. Robert Watson (late of the Doncaster Gas Department), who had previously been elected to Associate Membership on his retirement as Ordinary Member, should be made an Hon. Member of the Association in recognition of his services to Public Lighting.

Cleethorpes' Two-Part Tariff Scheme

Believed to be one of the earliest schemes of its kind to be adopted by a Company as distinct from a Municipal Undertaking, a domestic two-part tariff scheme is to be put into operation on July 1 by the Cleethorpes Gas Company. The Engineer and Secretary, Mr. F. G. Brockway, has been kind enough to forward us the following particulars of the scheme:

Domestic Two-Part Tariff.

ORDINARY METERS.

Service charge	5s.	per month, prepaid
Gas	5d.	per therm
Less discount for monthly payment at Gas Offices within ten days	¼d.	per therm
Net	4¾d.	per therm
The charge on flat rate is	9d.	per therm
Meter rents	6d.	per month

PREPAYMENT METERS.

Service charge	5s.	per month, prepaid
Gas, 408 cu.ft. for 1s.	6·5d.	per therm
Less rebate 1s. 3d. in £	0·4d.	per therm
Net	6·1d.	per therm
The charge on flat rate is	11·7d.	per therm

If the service charge of 5s. is not prepaid when due, the meter to be set back to flat rate forthwith.

Oldham Street Lighting

Superintendent's Report for the Year

The Annual Report of the Street Lighting Department of the Oldham Corporation for the Year ended March 31, 1935, states that the Department is responsible for the lighting of 118 miles of roads and streets in the Borough.

The number of hours during which lamps have been lighted during the past year is 3,756. The lighting arrangements for the Collier Hill housing estate have also been completed; this estate is lighted by gas. New gas lanterns of modern design have been fixed to replace lamps which were worn out and not windproof; the number dealt with is 73.

The Department have also fixed 480 stainless steel reflectors in the gas lanterns. The burner capacity in the lanterns has been increased in 14 streets, in most cases from 1-light to 2-light burners. Holophane dish refractors have been fixed in the suspension type gas lamps in Cross Street and Shaw Road; the light distribution has been considerably improved.

The policy of the Department in the past has been to employ automatic clock controllers to extinguish the gas lamps at midnight, which has of course resulted in considerable economies in gas consumption. An experiment has recently been made in one district of controlling the all night lighting in similar fashion; the results up to the present would appear fully to justify the experiment. Last year the restriction of street lighting for the summer on April 22 was commenced, by reducing same to 66% of the normal; this percentage varied from this point according to the month; by this method very few complaints of inadequate lighting were received. The saving of gas by the use of automatic controllers set to extinguish at midnight is 19 million cu.ft. Additional gas lamps fixed total 45 against 10 electric ones.

British Standards Institution

Annual Meeting and Luncheon

The Annual Meeting of the British Standards Institution was held at the Institution of Mechanical Engineers on Tuesday, May 28, with Dr. E. F. Armstrong, F.R.S., in the chair. In presenting the report, he said the year's work showed that over 150 thousand copies of the B.S. Specifications had been sold and distributed during the year, an increase over last year of 23,000, and that there are now 700 Committees holding over 1,000 meetings a year, the total membership exceeding 5,000.

Mr. W. Reavell, a Past-President of the Institution of Mechanical Engineers, has been elected Chairman for the ensuing year.

Perhaps one of the most important results of the year's work is the increasing success of the inter-Imperial co-operation which is now so firmly established.

British Standard Specifications are good propaganda for British trade and it is to be noted that over 12,000 copies have been sent to Diplomatic and Trade Commissioners in all parts of the world, so that they may maintain complete sets which may be consulted by those desiring information regarding British products, as represented by British Standard Specifications. The Government continues its whole-hearted support of the B.S.I. as the National Standardizing Body in this country.

At the Luncheon held subsequently, Dr. Burgin, Parliamentary Secretary to the Board of Trade, congratulated the B.S.I. on the progress it was making. He testified to the increasing value of the B.S.I. to the Government Departments and ended with a note of caution with regard to the essential necessity of preventing standardization ever going so far as to interfere with invention or research.

A message was received from the Rt. Hon. Stanley Bruce, the High Commissioner for Australia, who was unable to attend the Luncheon, regarding his view of the contribution to inter-imperial trade which the B.S.I. and the Standards Association of Australia were making by the adoption of common standards.

The Rt. Hon. G. W. Forbes, Prime Minister of New Zealand, wished the B.S.I. success in the great work it was doing, and hoped that the newly formed Standards Institution in New Zealand would take its place with the other standardizing bodies in this great Commonwealth of Nations.

Dr. Armstrong, the retiring Chairman, and Mr. W. Reavell, Chairman of the General Council for the ensuing year, replied in suitable terms.

UNDER THE LENS

By *Quidnunc*

As Others See Us

The Gas Industry has suffered a good deal at the hands of politicians, both amateur and professional. We all know the Parliamentary Tadpoles and Tapers whose idea of fuel policy is to electrify everything except the benches of the House of Commons, in the simple faith that complete electrification of the country will banish both unemployment and work, simultaneously. Equally familiar is the village Hampden who constitutes himself an unpaid propagandist of electricity, and makes the use of electricity a political issue in the deliberations of the local Council. A regrettable example of the latter type is the north-country Mayor who recently condemned the Gas Industry to a painful death, and was shocked at the hardihood of those who ventured to disagree with him.

For all his unconscious buffoonery, the politician with an electrical bee in his bonnet is always a source of danger. "National Planning" has become a catchword for members of all political parties; and undoubtedly fuel policy must be placed in the forefront of any national economic plan. "It is significant," says a well-known Socialist writer, "that the most important extensions of public ownership in recent years have taken place, not by the action of Socialist Governments, but under Conservative or bourgeois auspices. This applies, for instance, to the Electricity Supply Act, which set up the Grid system, and made the bulk transmission and sale of electric current a public monopoly." In other words, the temper of the times runs towards political interference, and in its own interests the Gas Industry must make its national importance known to every person who takes the slightest interest in national or local politics.

Views of the Intelligentsia.

With this point in mind it is interesting to review two broadsheets,* dealing with the gas and electrical industries, which were recently issued by "Political and Economic Planning." These broadsheets are the work of a group of industrial experts whose views receive an attentive hearing in the more serious sections of the Press. Their influence is steadily growing, and their analysis of the fuel position is worthy of careful consideration by all gas men.

The authors begin by emphasizing the need for a basis of fair competition. As between gas and electricity, "the ultimate solution should be based on the preference of the consumer. The choice is a valid one only between alternative sources of supply operating under the most economical conditions. Accordingly, any attempt at planning in the light of national requirements would seek not only to secure internal efficiency in the production of both electricity and gas, but also to prevent any rise in the cost of the two services to the public on account of wasteful competition."

How would such a fuel policy affect the Gas Industry? The authors mention its "multiplicity of organizations" which, they suggest, cannot afford a complete solution of present problems. New machinery is needed if the Industry is to control the lines of its own development. Four specific lines of progress are suggested:

(1) The grouping of undertakings on a regional basis, not to secure physical amalgamation, but to provide proper commercial, technical, and financial facilities as economically as possible. ("Probably an impartial verdict would concede that holding companies had done a substantial amount of good, but that a planned reorganization of the Industry could do better.")

(2) A more flexible system of price regulation which, without permitting exploitation of the consumer, would relate the charges more closely to the cost of providing the service.

(3) Large-scale organization for sales of industrial gas. (Speaking of the existing Industrial Centres, the authors say: "The scheme is of great interest not only for its enterprise, but also because it suggests possibilities of extending co-operative services on a regional basis.")

(4) Large-scale operation in the working-up of by-products if these are to be produced and disposed of economically.

* Copies of these broadsheets are obtainable upon application to the Editor, 16, Queen Anne's Gate, S.W. 1.—ED. "G.J."

This review of the Gas Industry ends on a note of tempered optimism. "Its future will largely depend on its ability to adjust itself to an inevitable falling off in the rate of expanson in its number of consumers as population growth slows down and the price of electricity decreases, and perhaps also upon its success in developing the sale of gas for industrial purposes. But we must not conclude that the existing level of effective demand represents the maximum attainable and that the future can only see a struggle to re-apportion it. There remain vast additional untapped demands for heating cold and draughty rooms and passages, for more and hotter daily baths to be taken in millions of homes, and for countless specialized appliances to be operated by an increased output from one or other of the industries which supply coal on tap."

Diagnosis of Electricity.

The treatment of electricity is equally sympathetic. "Does the consumer want electricity? The answer is clear. The consumption of electricity has gone up some 50% since 1929. About half the houses in Great Britain are connected with electricity, and their number is being added to at the rate of half a million a year. If there is a complaint, it is rather that the would-be consumer cannot get a supply, and not that the suppliers cannot get customers." A comparative table shows that the consumption per head of electricity in Great Britain is less than one-half that of Sweden, Switzerland, or U.S.A., but compares favourably with that of any other European country. Suggestions for improvement are given:

(1) Electricity supplies must be made available in every area, though the provision of new capital for this purpose will raise special problems.

(2) Current must be made cheaper by reorganizing badly designed distribution systems, preventing wasteful overlapping, abolishing restrictions on municipal trading, and reversing the sales policy of undertakings which make large profits by unjustifiably high prices.

(3) Credit facilities must be provided for assisted wiring, schemes for hire and hire-purchase of appliances, &c.

(4) Simplification of domestic tariffs.

(5) Standardization of systems and voltages. This should result in a reduction of prices for appliances.

"The demand for electricity," say the authors, "is persistent and increasing, and calls for cheap and sufficient supplies for domestic and other uses. There are difficulties which must be met, but once a satisfactory scheme has been evolved it must be carried through firmly, and if voluntary action fails it will have to be enforced through compulsory measures."

A Moral for Gas Men.

There is a familiar ring in this analysis of the electrical position. The shortcomings of the national electrical system have been ventilated many times in the columns of the popular Press. Yet it is noteworthy that these "exposures" are often prefaced by a glowing account of the advantages of electricity, and fanciful word-pictures of a future time when electricity will be cheap enough for all. One reason for this is that the writer wishes by exaggerating the virtues of something which is too expensive for his readers, to deepen the guilt of those who are held responsible for high prices and defective supplies. But another and more important reason is that the public have been led to think of the electrical industry as a national concern, and to interest themselves in its welfare as an issue of national importance. There can be no doubt that the Grid has exerted a powerful effect on the layman's imagination.

The national importance of the Gas Industry, on the other hand, has never been brought home to the man in the street. As the authors of this pamphlet suggest, "the very familiarity of gas, which is used by almost every household in the country, and also largely by industry, has had the effect of distorting the perspective. In some ways it would be much more helpful to look on it not as a 'gas-producing' industry, but as a group of methods of processing coal. . . . Even from the point of view of the

consumer, it is now misleading to look on the gas undertaking as supplying a commodity, 'gas,' through pipes. Rather, the undertaking is supplying a service. Where once the concern looked upon itself as having fulfilled its part of the bargain when gas was delivered at the consumers' house, now it takes the responsibility of providing the user with apparatus, of maintainng it, and of educating the consumer in its use. It must always be remembered that the boundaries of the Industry enclose such divergent functions as the large-scale production and sale of commercial derivatives of coal, as well as the giving of advice on some of the more intimate problems of household management and kitchen design to housewives and architects, or upon heat treatment of steel to engineering companies."

The time is ripe for the Gas Industry to tell its own story, to "humanize" itself to its consumers, to show them the romance and scope of its operations, the co-operative spirit which has led to its organization on national lines without loss of individual initiative, the enlightened relations between employers and employed throughout the Industry. We should not be satisfied until every consumer realizes that he is in effect a partner in his own gas undertaking, with a personal interest in its welfare and a citizen's interest in the prosperity of the whole Gas Industry as a national asset. If the story is told with an imaginative appreciation of its possibilities, and told in every available medium—in the Press, in films, at schools, in lectures, and through societies—it cannot fail to rouse popular interest. I should like to see the B.C.G.A. tackle the problem with vigour. The plight of the coal mines and the completion of the electrical Grid have wakened the public to the importance of our national fuel policy; it is high time that the Gas Industry showed its hand.

London and Southern District Junior Gas Association

Summer Visit to Winchester

In ideal weather conditions some 140 members of the London and Southern District Junior Gas Association and their ladies met at Winchester on Saturday, June 22, on the occasion of their annual summer visit. Excellent arrangements for a day full of interest had been made by the Winchester Water and Gas Company, and the only regret was that Mr. H. C. Head, the Managing Director and Engineer, was, as a result of his recent illness, unable to be present.

The bulk of the party, accompanied by the President (Mr. F. C. Smith), arrived from London by motor coach and were joined at the Winchester Gas-Works by a number of others who had travelled in their own cars, the members being welcomed by Mr. G. S. Coburn (Assistant Engineer). The visitors then inspected the gas-works, which are situated in delightfully rural surroundings a mile or so out of the city. The Winchester Works were originally laid down by the late Sir Corbet Woodall, which is sufficient testimony to their general layout. The whole plant is neatly planned, with ample space for extensions when required. The carbonizing plant consists of horizontal retorts, while there is supplementary gas-making plant in the shape of two water gas sets. Cooker reconditioning shops are also situated at the Works. The annual sales of gas by the Winchester Company amount to some 215 million cu.ft., the amount of coal carbonized being over twelve thousand tons. The Company serves about seven thousand consumers and is making very marked progress at the present time.

From the gas-works a visit was made to the water works, where the pumping plant and machinery were inspected.

A Welcome to Winchester.

At the conclusion of the inspection of the water works the visitors were entertained at lunch by the Winchester Water and Gas Company—Mr. H. W. Warren (Vice-Chairman of Directors) presiding.

Mr. G. S. Coburn (Assistant Engineer) offered on behalf of the Company a very hearty welcome to Winchester, at the same time saying how sorry Mr. Head, the Engineer and Manager, was at not being able to be with them. He had, however, expressed the hope that they would have a thoroughly enjoyable day. Finally, he voiced their appreciation to the Cathedral and College Authorities for the facilities which were to enable them to visit these buildings in the afternoon.

The President (Mr. F. C. Smith, of the Gas Light and Coke Company) thanked the Winchester Water and Gas Company, on behalf of the Association, for their kind invitation and hospitality. Referring to the progress of the Winchester Company he said that last month they had recorded an increased consumption of gas of no less than 10·8%, while the present month showed an increase to date amounting to 7·1% compared with the figures of the previous year. The increase for the year so far amounted to something like 2·1%—and this in the face of strenuous competition in the shape of a municipally-owned electricity undertaking. The Company were therefore to be congratulated upon the wonderful efforts they were making, and they wished them a continuance of their good work for the Gas Industry. They were sorry that Mr. Head was unable to be with them, and they wished him a speedy and complete recovery to health and strength after his illness. Having referred with pleasure to the presence on that occasion of Mr. E. L. Nicholas (Guildford), President of the Southern Association of Gas Engineers and Managers, Mr. Smith concluded by wishing the Winchester Company all success in the future with the hope that gas would continue to thrive in the City.

Mr. J. M. Webber (Croydon), Senior Vice-President of the Association, formally proposed a vote of thanks to the Winchester Water and Gas Company for their hospitality and also to the guides who had shown the visitors round the Works. He asked the visitors to drink the toast of the Directors and Officials of the Company.

Mr. H. W. Warren acknowledged the toast on behalf of the Company, at the same time apologizing for the absence of the Chairman of Directors. The Winchester Company were only too pleased, he said, to do what they could at all times to help the Gas Industry—and visits of this kind were most valuable.

Mr. E. L. Nicholas thanked the President for his kind remarks and wished the Association every success. He also voiced his own personal thanks to the Chairman and Directors of the Winchester Company.

The Cathedral.

During the afternoon the visitors were taken over the Cathedral and College Buildings. Gas is used to a large extent for lighting in the Cathedral, while our readers will doubtless recall that the whole of the central heating is provided by gravity feed coke boiler equipment. This plant was described and illustrated in the "Journal" for Feb. 20 last. Two gravity feed boilers of 2,000,000 B.Th.U. capacity each are housed in a boiler house some 200 yds. from the Cathedral, and so effective is the lagging of the underground pipes that barely 2° is lost in transmitting the hot water this distance. Some idea of the magnitude of the task which is so admirably carried out by coke will be gained by the main dimensions of the Cathedral, which are: Extreme length, 556 ft.; length of nave, 250 ft.; extreme breadth at transept, 217 ft.; and height of roof ridge, 109 ft. The visitors made a thorough tour of the Cathedral, which is the second longest edifice of its kind in the world, and contains some of the finest examples of Norman work in the kingdom, this being chiefly noticeable in the transepts.

From the Cathedral the members passed on to the College Buildings, which, founded by William of Wykam, contain many interesting and historical features, including the fine cloisters and chapel.

Tea was subsequently provided by the Winchester Water and Gas Company, and a most enjoyable day was brought to a conclusion with many expressions of thanks to the Company for their hospitality.

North of England Auxiliary Association

Chairman's Address

of

S. W. A. WIKNER, F.I.C., of the Newcastle-upon-Tyne and Gateshead Company.

The Half-Yearly Meeting of the North of England Gas Managers' Association (Auxiliary Section) was held at Newcastle-upon-Tyne on June 21, 1935

S. W. A. WIKNER.

Mr. S. W. A. Wikner was educated at the Hull Municipal Technical College. In 1899, he entered the Hull Works of Messrs. Major & Co., Ltd., Tar Distillers, as Works Chemist, being appointed Works Manager in 1907. From 1911 to 1919, he was Works Manager of the Nechells (Birmingham) Tar Distillation Works, at that time owned by Messrs. Josiah Hardman, Ltd. In 1919, he was appointed to his present position of Manager of the St. Anthony's By-Products Works of the Newcastle-upon-Tyne and Gateshead Gas Company. Mr. Wikner was elected a Fellow of the Institute of Chemistry in January, 1924.

In the first place I wish to express my appreciation of the honour of having been elected your Chairman. This office, while not particularly arduous, cannot be taken lightly, and I thank you for the confidence reposed in me.

In this Address I propose to deal with some aspects of the work done at the St. Anthony's Works of the Newcastle-upon-Tyne and Gateshead Gas Company in our efforts to turn to the best account the non-aqueous liquid by-products produced in the manufacture of gas.

I have not thought it necessary to describe the processes in detail, as this was done in 1927 in a Paper which was submitted to the Senior body of this Association, and moreover during the visit to the works to-day you will, I trust, have been given a fairly complete description of the various processes.

Crude Tar.

The primary object of our work is to convert the crude tar into more valuable products, and upon the extent to which this conversion can be made remunerative depends the degree to which the separation or refining of products can be carried. Thus in comparatively small works it is not usually worth while to proceed beyond the first distillation of tar, the resulting distillates being sold to refiners to be worked up. At the St. Anthony's Works the quantity handled permits of a further step in refining the distillates, the products obtained from them being benzole, toluole, naphthas, crude carbolic, and cresylic acids, naphthalene, and pyridine.

These products, while collectively of substantial value, are individually too small in quantity to make further refinement at this works practicable. After allowing for the inevitable water and loss, the remainder of the tar is recovered as creosote, pitch, and refined tar.

A frequent cause of trouble arises from excessive proportion of water in the crude tar as received by the distiller. The cost of transport of unwanted water and the trouble and risk incurred in preparing watery tar for distillation are obvious, but of more serious moment is the probability that the entangled water will contain a substantial amount of ammonium chloride in solution. This salt is, of course, not removed during any process of dehydration by distillation but is left behind in the tar to cause serious corrosion of the metal of the main tar stills.

Removal of water can be effected more easily and cheaply by distillation, but the more rational method would be by mechanical means, the ammonium chloride at the same time being proportionately reduced.

Dehydration by centrifuge is occasionally possible, but is not uniformly successful, and in any case is expensive in labour, as the machines need frequent cleaning to remove the deposit of sludge so that such treatment is not general.

No doubt the production of bad settling watery tar is due to some factor in carbonization or the subsequent handling of the tar in storage, the exact cause of which is frequently difficult to ascertain. The solution of the problem appears to lie with the producer rather than the distiller.

The Main Tar Stills.

The well-settled tar is dehydrated by a process of steam distillation and is then distilled in continuous stills of the Hird type.

The relative merits of continuous and intermittent processes for the distillation of tar have been frequently discussed. My experience of tar distilling may be divided into two almost equal periods, the first of which was concerned with intermittent stills, the so-called "Pot-stills" of capacities varying from 15 to 40 tons, with and without preheaters, and the second period having been spent with continuous Hird stills. Both periods cover a regrettably large number of years, affording an opportunity perhaps given to few to form an opinion on the relative merits of the processes.

Briefly it may be said that each process has both advantages and disadvantages with the balance somewhat in favour of the continuous, but not markedly so, which probably accounts for the fact that by far the larger quantity of tar in this country is distilled by the older intermittent system.

As regards capital cost, there is not much to choose between the two, although for a given throughput the continuous plant requires less ground space.

The continuous system has the following advantages: Less risk of fire, as a smaller quantity of tar is being heated at a given moment. Some of the most disastrous fires in tar works have been caused by failure of the bottom plates of pot-stills.

Repairs are slightly cheaper and much easier to carry out, wear being usually confined to the heating tubes and steel tube plates which can be replaced in a few days. Repair of pot-stills is a boilermaker's job, requiring weeks or months, and frequently much brickwork has to be removed.

Less nuisance from foul gases which are not given off in large volume over a short period but in a uniform, controllable stream and to some extent absorbed by the distillates. Instead of being transferred in large bulk, the hot residue of pitch or partly distilled tar is delivered in a steady small stream, with less risk and nuisance and affording particular convenience for the manufacture of road tar.

On the other hand, the intermittent system shows a small advantage in cost of fuel and wages, particularly if

the plant is closed down at the week-end to avoid Sunday overtime, a proceeding not usually expedient in continuous distillation.

Separation of desired fractions is much simpler, since any number of cuts may be made. In the continuous plant the number of fractions is limited to the number of stills, and one fraction cannot be altered without disturbing the others and affecting the rate of throughput. The working of continuous stills is more easily controlled if fluctuations in the water content of the tar feed are avoided, and from this arises not the least of the advantages of the process which we introduced in 1922 for dehydration of tar by steam.

Crude tar of water content varying up to 15% may be fed to the dehydrator, from which it issues practically free from water and at a uniform temperature, conditions which make for even working and regularity of products at the tar stills.

A convenient and dependable means of measuring the rate at which tar is being distilled is necessary, and it is found that actual measurement of the tar in feed tanks, which may be fitted with float gauges, is more satisfactory than the use of flow meters or by counting pump revolutions.

It was formerly the practice to run the pitch directly from the plant into the beds in constant stream. Control of quality was unsatisfactory, and if variation was observed the faulty pitch was already in the beds. Furthermore, pitch run into deep layers took a long time to cool owing to the peculiar disposition of the stream of hot pitch to sandwich itself between layers of solidified pitch at the top and bottom of the bed, the non-conducting character of which delayed the cooling of the middle layer. Beds of 8 ft. in depth took several weeks to cool, and much trouble occurred in winning the pitch and subsequently in its sticking in the bottom discharge wagons used to convey it to the ship for export.

These difficulties have been overcome by providing collecting tanks to hold the day's make of pitch. Tests are made during filling and the quality controlled before the pitch is run to the bed. The hot pitch, running off, quickly spreads in a thin layer over the whole of the bed and is cool before the next batch is run off.

Road Tar.

At present more than half of the tar produced in this country is used in the manufacture of road tar. A considerable quantity of bitumen, either imported or manufactured here from imported material is also used in road work. The quantity of this imported bitumen is not known, but there is reason to believe that if it were displaced by home-produced tar probably half of the tar now distilled to pitch would be absorbed, greatly to the advantage of the tar-producing industries and to the community. To bring this about considerations of sentiment or national policy will not carry much weight unless it can be proved that tar will give at least as good service at an economic cost.

The fact that already so large a proportion of tar is being used on the roads is distinctly encouraging. The question of the quality of tar for road work is receiving very full attention on national lines, research is being carried out and specifications are issued and periodically reviewed which provide for qualities which will give the best results while ensuring an adequate supply of tar for road purposes throughout the country.

When specifications for tar were first introduced, about 1914 or perhaps earlier, the method of manufacture was to distil to that temperature which would leave a residue complying with the specification, producing, that is, a "straight-run" tar, and it is probably correct to say that much road tar to-day is produced by this method. In most cases the resulting tar will comply with the specification, although it may be necessary to blend tar from vertical retorts with a heavier tar to bring the specific gravity within the prescribed limits.

Our experience prompts us to question whether this is the right way to make the best road tar. Some years ago certain large and well-informed buyers drew up their own specifications. These specifications, coming from entirely independent sources, show marked similarity, the principle divergences from the standard specifications being as follow:

Specific gravity—as near 1·20 as possible and certainly not below 1·18, thus ensuring that only well cracked tar of high temperature origin is used.

Tar acids—as low as possible; not more than 1·5%. This reduces the water soluble constituents, making the tar less toxic and probably more stable.

Naphthalene—as low as possible; not more than 2%. The opinion is strongly held that even a small excess is deleterious, but the reason for this is not clear. Naphthalene has the effect of reducing the viscosity of oils, is volatile and liable to crystallize, and probably affects the binder in some way.

Tars of this quality cannot be made by straight distillation, but must be distilled nearly to pitch to remove the oils bearing tar acids and naphthalene, the residue being cut back with selected oils from which these products have been removed. At St. Anthony's we were already distilling in this way to recover the valuable tar acids. It was a simple step to recover also the naphthalene, plant being erected for this purpose, and additional revenue gained thereby.

That this special tar does give better results in practice is definitely stated by the users who for some seven years have taken many thousands of tons annually. The reason for this improvement is not quite clear, but is probably due to two factors—one the lower content of naphthalene and tar acids, the other, and in my opinion the most likely, that some alteration occurs during the over-distillation necessary to produce such tar at all. It is known that if a tar is distilled to pitch and the distillate and residue remixed the quality of the tar is changed. A mildly destructive action has taken place, the final tar being more viscous, higher in specific gravity and containing more free carbon than the original. It seems reasonable to assume that any change due to over-distillation must be towards greater stability.

Bitumen-Tar Mixtures.

The addition of bitumen to tar is fairly common, as also is the idea that this addition is wholly or in part made with the object of raising the viscosity. In my opinion this is a wrong conception. Addition of bitumen is not the only nor indeed the most convenient means of raising viscosity, as surely the easiest and most obvious means is by taking the distillation further or adding less oil in cutting back. The purpose of the bitumen is I think to extend the viscosity-temperature range of the mixture—*i.e.*, to make it less brittle when cold and less fluid when warm—or to increase the stability of the pitch base against deterioration by ageing or weathering. How far the addition of, say, 10%, can be of value is, perhaps, doubtful. We do not consider that a 20% mixture is necessarily of a higher viscosity than one of 10%; both percentage and viscosity must be specified. Tars and compounds are supplied of a range of viscosities containing various percentages of different bitumens, and though we cannot, as in the case of a well known advertiser in an entirely different line of business, boast of 57 varieties, we do have quite a number. As prompt delivery is included in our idea of service, storage is provided for the different grades; the task of making and storing some dozen or more qualities becomes somewhat complicated, and more expensive than might be thought necessary.

Our aim has been to develop the manufacture of road tar and so reduce the amount of pitch produced, and the extent to which this object has been realized is in some measure due to service given. Delivery of tar, hot and ready for use, in insulated road tank wagons, has been of much convenience to the user, and has led to increased business.

The alteration in road licence dues imposed in the Budget of 1933 is unduly harsh in the case of tank-wagons as compared with other commercial vehicles. Taxation based upon the unladen weight which includes the heavy tank and fittings is much higher, while the pay load, limited by the maximum legal load, is much lower. Each of our tank-wagons bears an annual tax of £110, with a pay load of 5½ tons, whereas the average goods vehicle of a similar type of chassis pays £50 and carries a pay load of 7½ tons. This astonishing comparison bears no relation to the wear on the roads caused by the respective vehicles, the laden weight being the same in each case, and one must conclude that convenience in assessment has prevailed over any sense of equity in determining the incidence of this tax.

Creosote Oil.

The lighter fractions from the Hird stills are worked up, the tar acids being extracted by washing with caustic soda, and the washed oils distilled for the separation of benzole and naphthas. The residue after extraction of these products is added to the creosote fractions from the tar stills.

At the present time, in view of recent developments both in industry and legislation, the position of creosote in commerce has become of great interest.

Creosote oil by reason of its aromatic character possesses unique properties, the value of which is only now being properly realized. The one important outlet in the past has been for the preservation of timber, for which purpose

it has held, and still holds, an unassailable position. For some years, however, the production has exceeded the demand for this purpose, and the price obtainable has been much below its intrinsic value.

New outlets are now being found, notably the use of creosote in the hydrogenation of coal for the production of motor spirit, and it is believed that there may also be a demand for creosote in connection with processes now being developed for the carbonization at low temperatures of coal-oil mixtures.

The most intriguing prospect, however, has been opened up by the proposal to impose the full tax of 8d. per gallon on oil used in road motors of the compression ignition type. How will this affect the value of creosote?

In the effort to find outlets for creosote some measure of success was obtained in its use in spark ignition motor engines, made possible by the high temperature at which spontaneous combustion under pressure would occur; in other words, the anti-knock effect of its aromatic constituents. Unfortunately, it is just this property which makes creosote inferior to oils of a paraffin origin as fuel in the compression-ignition engine. Another drawback to its use for this purpose is the difficulty of ensuring its complete fluidity at ordinary temperatures, the deposition of naphthalene and other solids, good enough fuels in themselves, being certain to cause trouble in use. The solution of these problems is by no means insuperable. It is known that by the addition of dopes such as ethyl nitrate the temperature of spontaneous combustion of creosote can be lowered, although no information regarding the proportion required nor the cost is yet available. The requisite fluidity can easily be obtained by mixing with the required proportion of petroleum oils, a precedent for which may be found in the mixing of benzole and petrol in National Benzole Mixture. In this connection it will be interesting to know the maximum proportion of creosote which may be added to the oils at present in use without interfering with their efficiency and suitability.

With an eye on that 8d. no time should be lost in carrying out the research obviously necessary to solve these problems.

To review the possibilities, the annual consumption of motor fuel in this country exceeds 1,000 million gallons, whereas the total production of creosote is in the neighbourhood of 60 million gallons, a mere 6%. From the figures given of the estimated loss of revenue to the Exchequer it is calculated that the annual consumption of heavy hydrocarbon oil in compression ignition engined motors is already approaching 25 million gallons. The scope, therefore, may well be enormous, and at the least we may look forward to more satisfactory returns for creosote.

Benzole.

Crude benzole produced at three of the Company's stations is transferred by rail to St. Anthony's and is refined along with that obtained from the distillation of tar, the motor benzole produced being taken by the National Benzole Company.

By this centralization of refining there is a saving in working costs, and the residues can be worked up to advantage with tar distillates of a similar character. Also it frequently happens that individual benzoles may fall outside the specification limits by reason, say, of low specific gravity or high sulphur content; these discrepancies tend to disappear or be minimized in the average, with some saving in cost and trouble.

Refining is by the inhibitor process, in which, by omitting the former rectification with strong sulphuric acid, the unsaturated hydrocarbons are recovered as good motor spirit, giving in our case an increase in yield of about 5% of motor benzole with a saving in cost of acid. Some of the unsaturated hydrocarbons have a tendency to form gum during storage, which would give trouble from blocked induction pipe and inlet valves when used in the motor engine. This tendency is arrested by the addition of a small proportion (0·03%) of cresylic acid.

The introduction of the inhibitor process by the National Benzole Company represents a notable advance in the practice of benzole-refining, not only in increasing yields from existing plants operating on horizontal retort and coke oven gas but opening the way to economic recovery of benzoles from vertical gas and even carburetted water gas. The difficulty and loss incurred during the acid-washing of these benzoles has hitherto discouraged their extraction.

In the general application of the new process the lower costs and enhanced yields show a substantial saving, and amongst minor advantages it is a relief to be rid of troublesome acid-tar. It might be thought that refining has become much more simple and brought within the reach of every producer of crude benzole. Without intending to disparage the manifold benefits resulting from the inhibitor process, it may be said that in our experience the refining, as regards control of quality, has become more complicated.

The acid wash was well understood, the reaction quick and complete, and the resulting benzole of good colour, sweet in odour, and there was little difficulty in keeping the sulphur content down to the limit. The acid wash test occupied only a few minutes and was conclusive, so that, providing the distilling points were controlled, there was little to go wrong.

In the new process the acid wash test is replaced by an oxidation test to ascertain the tendency of the benzole to form gum. This ingenious test, in which the benzole is treated with oxygen under very exact conditions, requires to be carried out by a fairly competent chemist and takes about a day to complete. The action of the minute quantity of inhibiting agent in preventing formation of gum seems to be easily deranged by unknown factors, and every batch must be carefully tested. Usually the sulphur is too high, and in our case carbon disulphide must be reduced by chemical means as described in a Paper read last year before a meeting of The Institution of Gas Engineers.

Occasionally the benzole distilling over in the later fraction has a deep yellow colour, and the bulk fails to pass the colour test. On a recent occasion this was found to be due to the inclusion of carburetted water gas in the main gas stream entering the benzole scrubber at one works. To avoid this yellowing, the benzole must be given a partial acid washing, either the whole or the yellow fraction only being treated. Generally, it may be said that with the new process more supervision must be exercised.

In the interests of the Industry the good reputation of benzole as a motor fuel must be maintained, and this calls for the closest control of quality and unremitting care in manufacture, the cost of which can best be borne by a large throughput.

Disposal of benzole in a crude or insufficiently refined state for use in motors will do disservice to the Industry. When freshly prepared, such benzoles are free from gum and can be used as fuel provided the very unpleasant smell can be overlooked. Formation of gum on keeping, however, is bound sooner or later to give cause for complaint.

In concluding this Address, I may say that I have purposely avoided attempting to refer to all phases of our work. A few topics have been selected upon which I felt that something might be written, indicative of our troubles and our hopes, which would possibly be found interesting.

Prior to the meeting, the members were conducted around the St. Anthony's Works, where, in particular, considerable interest was displayed in the refining of crude benzole by the inhibitor process by which the unsaturated hydrocarbons are recovered as good motor spirit.

The four groups of the party were conducted respectively by Mr. Wikner and his assistants, Messrs. W. H. Cunningham, W. A. Briggs, and F. Brown, members of the chemical staff.

Opening the meeting later, Mr. Wikner said that following representations to the senior body, they had for the first time held the summer meeting on a working day instead of the usual Saturday afternoon, and the attendance had certainly justified the change. The position as to future meetings was to be considered. It was decided formally to acknowledge the helpful attitude of the senior body in permitting the change.

The Chairman welcomed the following new members to the Section: Messrs. Armstrong, Gateshead; Read, Elswick; Sutcliffe, Durham; and Weatherley, Hexham.

Mr. A. H. Bagshaw (Sunderland), proposing a vote of thanks to the Chairman, said that they would all remember the Paper which Mr. Wikner had given before the senior body in 1927, when he had described the processes in detail. Those who had seen the St. Anthony's Works years ago would realize from their visit the wonderful progress that had been made there.

Mr. J. R. Porter (Jarrow), seconding the vote, said they had all been impressed with the neatness of the Works.

The Chairman, replying, thanked his staff for their co-operation in organizing and preparing for the visit.

Mr. T. T. Tarn (Darlington), proposing a vote of thanks to the Chairman, Directors, and officials of the Newcastle and Gateshead Gas Company, said that the Section was deeply indebted to them.

Mr. J. R. Cleator (Southbank) seconded, and the vote was carried.

Mr. Norman Reid (Gateshead) reminded members that early application should be made by students under the Hovey Educational Trust, so that everything could be arranged in time for the winter session.

THE DESIGN OF Small Coke-Fired Heating and Hot Water Service Installations

by L. J. FOWLER

This Paper was read by Mr. L. J. Fowler, B.A., A.M.Inst.C.E., of the London and Counties Coke Association, at a meeting of the Coke Salesmen's Circle in London on June 12—Mr. H. C. Smith, of Tottenham (Chairman of the Circle), presiding.

Central heating and hot water service equipment installed in England by accepted heating engineers, compares favourably with that of America, Germany, or any country; but the heating trade is still handicapped, and its work discredited, by the poor design of many small systems installed by those who cannot fairly claim to an adequate knowledge of the work which they are carrying out.

It is not possible here to give full information from which heating and hot water service installations can be designed, but general methods are indicated, and figures are given which will be useful in diagnosing the troubles of existing equipment. Brief reference is made to the method of determining the amount of heating surface required: this and the method of pipe sizing can be easily mastered after reference to standard text books.

Grateful acknowledgment is given to the courtesy of Ideal Boilers and Radiation, Ltd., for permission to publish the Tables, which are the results of research work carried out in their laboratories and in those of their associated companies.

Transmission of Heat.

Heat can be transmitted by conduction, radiation, and convection. Air is a bad conductor, with the result that little heat is given out from heating apparatus by conduction, the major portion being transmitted by radiation and convection. (Convection is the transference of heat by currents of warmed gases or liquids.) In actual practice radiation and convection are inseparable, but according to the design of heating surface, their relative proportions can be varied. The commonest form of heating apparatus, the ordinary "radiator," is not well named, for less than 30% of its heat is given off as radiation, the remainder being practically entirely convection. As a general rule the greater the number and the closer the spacing of the columns of a radiator, the greater is the proportion of heat emitted as convection. Conversely, the more closely the heating surface corresponds to a flat plane surface or "panel," the greater is the proportion of heat given off as radiation.

TABLE 1.

Type of Heating Surface.	Paint.	Colour.	Radiation.	Convection.	Reduction of Total Duty.
			%	%	%
Plane surface, wall position	Ordinary	Any	56	44	..
	Bronze	,,	41	59	25
Plane surface, ceiling position	Ordinary	,,	80	20	..
	Bronze	,,	70	30	36
Column surface	Ordinary	,,	27	73	..
	Bronze	,,	17	83	12

In the Table above, the effect of bronze painting on the heat transmission of various types of radiators should be noted. Metallic finishes must always be avoided on actual heating surfaces, for they have a low emissivity, and although the heating surfaces remain at a relatively high temperature, they are less effective.

On the other hand, metallic paints are to be recommended for use as a means of reducing heat loss from circulating pipes, boilers, storage cylinders, &c.

Calculation of Heat Requirements.

It has too frequently been the practice to install radiators of a size directly proportional to the cubic capacity of the room. This practice is to be deplored, and has done much to instigate a prejudice which has retarded development of central heating in this country. The standard methods of calculation used nowadays by heating engineers, though of a somewhat empirical nature, give very good results and are extremely simple. By means of Tables of Heat Transmission Co-efficients, calculation is made of the rate of heat flow through the walls, windows, floors, and ceilings, when the room to be heated is maintained at 1° F above its surroundings, and to this is added an allowance for an air change once or twice an hour, depending upon the type of room and its position.

Having assessed the heat requirements for a 1° temperature rise, it is then necessary to decide the temperature which is to be maintained, and to calculate the heat required to maintain this temperature when the external temperature is 25°, 30°, or 32°, whichever may be required. In doing this, reasonable allowance should be made for the general position of the room. If, for instance, it faces north-east and is exposed, considerable air leakage is likely to take place when cold north-east winds are blowing, and a margin should be added to the calculated requirements—15% is the usual allowance. On the other hand, if it faces south and is sheltered, a similar deduction can be made.

When radiators are to be used, it is then possible to calculate the area of heating surface required by the use of a Table, such as that given below, and from the makers' catalogue to decide upon the size and shape of the radiators.

TABLE 2.—*Transmission Table.*

For radiators placed 2⅜ in. from wall.*† B.Th.U. per sq.ft. per hour.

Ideal Radiators.	Temperature Difference (Degrees Fahrenheit). Water.					
	70	80	90	100	110	120
Neo-Classic No. 2	116	139	162	185	208	234
,, ,, 4	06	128	149	170	192	215
,, ,, 6	100	120	140	160	180	202
,, window	99	119	138	158	178	199
Clas ic wall	106	128	149	170	192	215
Plain single col.	100	120	140	160	180	202
,, two ,,	98	117	136	156	176	197

* The transmission is approximately the same when the radiator is placed 1½ in. or more from the wall.

† Exceptions are classic wall fixed on standard brackets with 2 in. and 1½ in. centres.

If it is decided to heat mainly by radiant heating, the method of calculating the heat loss is usually the same, but a smaller air change is allowed, since by this method of heating it is possible to be comfortable at a slightly lower temperature than with convection heating. With radiant heating, therefore, the thermometer is not a true criterion of the comfort condition, and this should be made perfectly clear to clients who contemplate using this method. Various forms of radiant heat are available in the form of cast iron or steel panels. Embedded panels are used to a great extent in large buildings, but are relatively costly for small installations.

Fixing of Radiators.

Care must be given to the fixing of radiators, in order that air may stream over them without undue obstruction. The effects of obstruction are clearly indicated in Table 3.

It is always desirable to fix the radiators beneath windows, or in those positions where the greatest heat loss occurs. When this is done warm air rises from the radiator, mixes with the air cooled by contact with the window or exposed surface, and prevents down draught. If a radiator is fixed on the wall opposite to the window, the warmed air rises from the radiator, passes along the ceiling, and air cooled by the window drops to the floor, and

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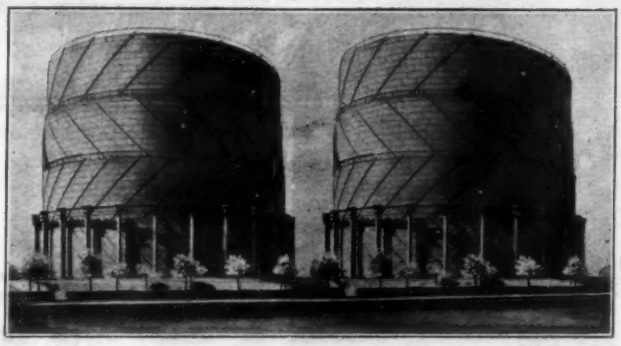

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thus a ready circulation of air is set up which may cause discomfort to the feet near to the window.

TABLE 3.—*Average Radiator Transmissions.*

B.Th.U. per sq.ft. per degree difference per hour.

Ideal Radiators.	Placed 2½ In. from Wall Except Classic Wall, Fixed on Standard Brackets.	With Flat Shelf or Deflecting Shield Fixed 3½ In. Above Radiator.	In Open Recess Distance from Top of Radiator to Top of Recess 3½ In.	Encased or with Metal Hangings in Front.
	Water 160–60.	Water 160–60.	Water 160–60.	Water 160–60.
Neo-Classic No. 2	1·85	1·78	1·70	1·48
,, ,, 4	1·70	1·63	1·55	1·36
,, ,, 6	1·60	1·53	1·47	1·28
,, window.	1·58	1·52	1·45	1·25
Classic wall	1·70	1·63	1·55	1·36
Plain single col.	1·60	1·53	1·47	1·28
,, two ,,	1·56	1·48	1·43	1·25

In small houses, however, the fixing of radiators on outside walls or under windows is comparatively costly, and taking builders' work into consideration, a reduction of as much as 30% may be made on the installation cost by fixing them on inside walls. This saving is due to a reduction in the length of piping, which also results in less fuel being used, especially in those systems in which the radiators are fed from the hot water service system.

Pipe Layout.

Having arrived at the size of the radiators required in each room, the layout and size of the pipe runs can be decided. Two general methods are available for arranging the pipes:

(1) The single pipe system.
(2) The two pipe system.

The latter gives better balance and is almost invariably used on large installations, but the former is cheaper to install, and if designed carefully, is usually satisfactory on installations up to twenty radiators.

Having decided upon the pipe runs, the size of the mains can be calculated; and in doing this, care must be taken to allow adequately for the transmission of heat from the mains themselves. In small heating installations the heat loss from the mains is frequently 30% of that from the radiators, but as the size of the installation increases, this percentage falls. Where the heat from the mains can be usefully employed in warming the buildings, they can be left uncovered, but in all roof spaces and where fixed under the floors, covering should be applied.

Pipe Covering.

Transmission losses from covered and uncovered mains are given in Table 4 below.

TABLE 4.—*Table of Iron Pipe Co-Efficients.*

B.Th U. per linear foot per hour per degree difference F.

Nominal Size of Pipe. In.	Uncovered.	Covered
	Water.	Water.
½	0·483	0·193
¾	0·618	0·247
1	0·758	0·303
1¼	0·934	0·374
1½	1·050	0·420
2	1·293	0·517
2½	1·545	0·618
3	1·884	0·754
3½	2·084	0·834
4	2·321	0·928
5	2·823	1·129
6	3·315	1·326

NOTE.—In the above table the covering is assumed to effect a saving of 60% in the transmission.

The importance of covering exposed pipes is not generally realized. As an example of the losses which take place from uncovered mains, it is worth recording that just one ton of coke must be burnt to maintain a 20 ft. length of 2-in. pipe at 140° F. for one year in surroundings at a mean temperature of 60° F. Pipe covering should be made with good material, or much of its advantage is lost. The most satisfactory materials are moulded cork or mineral wool, which save approximately 80% of the heat lost from uncovered pipes. Asbestos can be accepted as generally satisfactory for small pipes, and gives a saving of 60% to 70%.

Selection of Boilers.

(*a*) *Heating.*—The method of rating a heating boiler is not generally understood. The rating is an output which can be maintained continuously with a certain fuel for a definite period. Owing to a tendency on the part of some manufacturers to over-rate in order to reduce prices, the Institution of Heating and Ventilating Engineers set up a Boiler Rating Committee, which specified figures for density and calorific values of fuel, boiler efficiency, and charging periods on which ratings should be assessed. The fuel was to have a calorific value of 12,500 B.Th.U. per lb. under working conditions; 68% of the calorific value was to be available, and the rating was to be maintained on the basis of a 6-hour charge of fuel.

For a heating installation it is good practice to provide a boiler rated at sufficient capacity to develop the heat output of the radiators and pipes, *plus* a margin of 25%. This margin, which adds little to the cost of the completed installation, does more than ensure against errors in calculation, for it enables the heating apparatus to be started up rapidly, reduces the frequency of attention to the fire, and enables the boiler to be regulated to run at an even efficiency.

If a boiler is too small, continuous trouble will be experienced in maintaining the fire throughout the night. In a difficulty of this kind it is easy to check up the fuel capacity of the fire box by measuring the inside measurements of the boiler, multiplying by the height from the grate line to the centre of the fire door. The figure obtained, converted to cubic feet and multiplied by 27, will give the capacity in lbs. of coke. Assuming a 12,500 B.Th.U. calorific value, and 68% efficiency, the thermal capacity of the fire box can be calculated, and compared with the heating output required from the system.

Because a boiler develops a certain rate of output on a 6-hour charging period, it must not be assumed that the output can necessarily be doubled if charging is carried out every three hours, for under these conditions the efficiency will fall. A considerable increase above the rating can be obtained, but it is preferable to install a larger boiler and operate with longer stoking periods.

The practice of stating that a heating boiler is capable of feeding so many square feet of radiation, or so many feet of pipe, leads to confusion and should be avoided for two reasons. In the first place, the heat emitted from this radiation will depend upon the difference between the temperature at which it is maintained and that of the surrounding air; and in the second place, a rating of this type is again incomplete unless mention is made of the period through which the boiler can be left before recharging.

(*b*) *Domestic Boilers.*—Domestic boilers are usually installed to meet the maximum hourly demand of the installation which they supply. The rating of domestic boilers is usually based on a figure of at least 10,000 B.Th.U. per sq.ft. of heating surface, whereas that of heating boilers is approximately 4,000. It is often presumed that the difference in these two figures arises from the average lower temperature of the water in the domestic boiler compared to that in a heating boiler. This difference in temperature is, however, practically negligible, since it is so small a proportion of the difference between the temperature of the fire adjacent to the side of the boiler and that of the water. The reason for the difference of rating of the two types of boilers is that hot water service boilers are usually rated at their maximum hourly capacity, whereas heating boilers are rated to give the specified output over a definite period, such as 6 hours. In general, in domestic boilers the ratio of heating surface to grate area is kept small in order that boosting may take place rapidly at those times when there is a big demand for hot water. Most of the heating surface is primary, and the efficiency of the boilers is generally lower than that of heating boilers. Lower running costs of a hot water service apparatus are therefore obtained if an indirect system is installed, operated from a boiler of the heating type.

Typical boiler ratings of domestic and heating boilers are given in Table 5.

It is the normal practice in small installations to provide a hot water service boiler of a capacity sufficient to raise the temperature of the water in the storage cylinder through about 80° F. in one hour. The storage cylinder is usually sized to meet the maximum hourly demand. It is my view, however, that the storage cylinder should be made really liberal in capacity, and that it should be supplied by a comparatively small boiler, which can thus be run at a steady, moderate, and efficient rate. If this is done, the storage cylinder will be the buffer between the steady output of the boiler and the irregular demand of hot water for the household requirements. If the cylinder is efficiently lagged, the heat losses are small, and the increased losses due to the larger size are practically negligible. On the other hand, the boiler being run steadily, will not only

TABLE 5.—*Indicating the Difference in Methods of Rating Typical Boilers for Heating and Hot Water Service.*

"IDEAL" DOMESTIC.

No.	Heating Surface. Sq.Ft.	Grate Area. Sq.Ft.	Fuel Capacity. Cu.Ft.	Water Capacity. Galls.	Rating. Hot Water Supply. B.Th.U. per Hour.	Rating. Heating. B.Th.U. per Hour.	Rating. Heating. Sq.Ft. per Hour
1 . . .	2·5	0·47	0·64	4·00	25 000	11.250	80
2 . . .	4·0	0·47	0·88	5·00	40 000	18,000	125
3D . .	2·25	0·58	0·55	1·13	25.000	11.250	80
4D & 9D .	3·5	0·63	0·63	6·00	38,500	15.200	105

CLASSIC.

No.	Heating Surface. Sq.Ft.	Grate Area. Sq.Ft.	Fuel Capacity. Cu.Ft.	Water Capacity. Galls.	External Surface. B.Th.U. per Hour.	Heating Rating. B.Th.U. per Hour.	Heating Rating. Sq.Ft. per Hour.
1. .	5·0	0·73	0·60	1·.0	3,300	22,000	150
2. .	6·5	0·73	0·88	2·22	3,600	28,600	200
3. .	10·5	0·90	1·24	3·00	4 700	46,200	320
4. .	13·0	0·90	1·59	3·27	5,000	57,200	400

BRITANNIA.

No.	Heating Surface. Sq.Ft.	Grate Area. Sq.Ft.	Fuel Capacity. Cu.Ft.	Water Capacity. Galls.	Heating Rating. B.Th U. per Hour.	Heating Rating. Sq.Ft. per Hour.
05K .	14 0	1·24	2·8	10·5	62,000	430
15K .	26·5	2·27	3·5	17·6	117,000	815
25K .	45·0	3·24	5·35	30·6	200,000	1,385
35K .	70·5	4·88	9·13	67·4	313,000	2,170

run economically, but being fired according to a regular routine will not be as burdensome as if it had to be stoked irregularly throughout the day according to the demands for hot water. With a large cylinder, several baths can be drawn off exactly when required, thus avoiding the so frequent necessity of the boiler having to be fired up heavily overnight in order to provide several baths.

Small Heating Systems.

Circulation of water by gravity in heating and hot water service systems is due to the relatively high density of the water in the return pipe, compared with that in the flow pipe. For a temperature difference of 40° the difference in density sets up a circulating head of approximately $\frac{3}{16}$ in. for each foot of effective height. Water will thus circulate round the system at such a speed that the circulating head just exceeds the frictional resistance of pipe, fittings, boiler, and radiators.

To assist circulation and aid in the removal of air, it is normal to lay horizontal pipes with a fall of $\frac{1}{2}$ in. in 20 ft.

For large installations the pipes must be sized from the tables set out in various text books. For comparatively small two-storey houses, however, in which half-a-dozen or less radiators are used, provided the horizontal runs are not abnormally long, and the radiators are not abnormally large, it is safe to allow $\frac{3}{4}$ in. connections to each radiator, and to size the mains as follows:

	In.
Main feeding 1 radiator	$\frac{3}{4}$
,, 2 radiators	1
,, 3 ,, ...	$1\frac{1}{4}$
,, 4 ,, ...	$1\frac{1}{2}$
,, 5 ,, ...	$1\frac{1}{2}$

The pipes should be installed so that the frictional resistance of the fittings is kept as low as possible, bends being used instead of elbows.

The single pipe system is usually used in small heating installations, and trouble is rarely experienced in obtaining adequate circulation of warm water in the radiators in the upper floors. The flow to those on the ground floor, however, is frequently comparatively sluggish, and care must be exercised both in design and fitting. The connections to these radiators are frequently taken from a main being run horizontally, in which stratification of the water takes place, that at the top being considerably hotter than that at the bottom. Circulation in such radiators is accelerated if the T from which the flow connection is made is placed with its outlet on the top of the horizontal main and that connecting up the return on the side or even bottom of the main. In small installations it may be desirable to carry the whole of the return water through one or more of the radiators. In a single pipe system it must be remembered that the temperature of the water in the mains will fall as each radiator is supplied. The last radiators will thus be maintained at lower temperatures, and their size must be adjusted accordingly.

Cold Feed and Expansion Tank.

In a small heating installation the expansion tank is fitted above the highest point of the system, and must be of ample capacity to accommodate the increased volume of the water when heated. Water will expand approximately 1/23rd of its volume when heated to boiling point from 50° F., and allowing for the small depth of water which must always remain in the bottom of the tank, and for a certain amount of free board, it is usual to make the capacity of the tank approximately 1/15th of that of the water capacity of the complete heating installation, including the boiler, radiators, and mains. It is essential that the tank should be of ample size; otherwise, on heating up, water will pass out through the over-flow, and on cooling make-up will have to be taken from the cold feed. This will result in a gradual but continuous change in water in the heating installation, which will be liable either to set up corrosion or, in districts where the water is hard, to cause the formation of incrustation in the boiler and pipes.

It should be noted that water companies demand that the overflow connection in an expansion tank should be arranged below that of the cold feed, otherwise, when water expands, the ball valve is immersed, giving rise to a possibility of damage to the seating. At this point it is worth recording that the 1935 regulations of the Metropolitan Water Board stipulate that the pipes used in heating and hot water service systems shall be of steam quality.

Hot Water Supply.

In small installations two methods are in use—namely, the direct and the indirect. In the former, the boiler, storage, cylinder, and pipes all form one waterway; but in the latter an entirely separate circulation is run from the boiler to heating elements inserted in the storage cylinder, which becomes a calorifier. By this means the water in the boiler and the heating elements is practically never changed, and thus corrosion, discoloration, and deposition of solids do not occur. With the direct method, in hard water districts, chalk will be deposited in the boiler and pipe lines, and unless thorough cleaning is carried out at periodic intervals cracking of the boiler and complete furring up of the pipes will eventually occur, as well as a gradually increasing drop in efficiency as the furring of the boiler reduces the heat transmission from the fire to the water. When the water is soft, corrosion and discoloration are probable.

In small installations the direct method is usually cheaper, but in houses of £1,000 and upwards, I would always recommend the indirect. It is usually accepted that deposition does not occur until the water reaches 160° F., but actually the process starts at considerably lower temperatures, though admittedly at a comparatively slower rate. Deposition thus cannot be entirely avoided by running the system at a low temperature, although it can be mitigated to a great extent, by using a good damper regulator, to maintain the temperature at approximately 120° F. which is quite hot enough for normal domestic purposes.

Where radiators are run from a domestic installation, it is desirable either to install an indirect system, or, alternatively, to run the installation at approximately 120° F. making allowance in the sizes of the radiators for the lower mean temperature.

The indirect system is not only valuable to overcome the difficulties experienced with hard water; it is equally advantageous where the water is soft and corrosive, as under these conditions corrosion is restricted to the calorifier and the circulating mains. Where particularly corrosive water has to be used, the calorifier and circulating mains should be constructed of copper.

In indirect systems, the calculation of the size of the primary mains to a calorifier which is situated only a few feet above the boiler is an extremely difficult matter, and it is the usual practice to decide the size empirically, according to the following Table:

TABLE 6.

Size of Storage Calorifier. in Galls.	Sizes of Primary Flow and Return. In.
30	1
40	$1\frac{1}{4}$
50	$1\frac{1}{2}$
60	$1\frac{1}{2}$
80	2
100	2
150	$2\frac{1}{2}$
200	3

Sizes of Storage Tank.

The size of storage tanks and the daily consumptions of hot water are extremely vexed questions. It is common to size the storage cylinder to meet the maximum hourly demand of the installation, and for residences to adopt the following figures, representing gallons of water per hour at a final temperature of 140° for each type of fitting:

Lavatory basins	3
Baths	40
Showers	20
Sinks	10

According to this method, a house containing one bathroom, one sink, and three lavatory basins should have a storage cylinder of 60 gallons. As stated previously, I consider it always advantageous to be liberal in size with the storage cylinder.

Referring to fuel consumptions of hot water service systems, it is only possible to give these with any reasonable certitude on really large installations, sufficient in size to ensure that the personal habits of the various occupants will average out. In a small house the frequency of bathing of the occupants and the length and extent of insulation of the circulating mains will be the prime factors. In a large job it has been found that an average consumption is 4 lbs. of coke per day per person, but in a small installation this might be more than doubled.

Flues.

Care must always be taken to see that the flue is of adequate area and height, and free from sharp bends or off-sets In the same way, ample air supply must always be arranged to the boiler. In addition the flue must be air-tight, otherwise the draught will be checked; and it should be of sufficient thickness to prevent undue cooling of the gases as they pass upwards. If the existing flue is used, all other openings must be permanently sealed. In connecting the boiler flue to the vertical brick flue, care should be taken to see that the former does not project into the latter, otherwise a reduction of area is caused.

Discussion

A number of interesting points arising out of Mr. Fowler's Paper were brought up by various speakers in the course of the discussion which followed.

The first question related to the use of copper pipes in boiler installations, while another member sought information regarding the standard text books to which Mr. Fowler had referred in his Paper. Some surprise was expressed at Mr. Fowler's assertion that asbestos was less efficient as a lagging material than cork or wool, and the Author was asked to give the range in which the efficiencies he had mentioned held good. In regard to the question of water and corrosion, it was remarked that they all knew of the corrosion troubles occasioned by hard water, in which circumstances the normal procedure was to soften it. But apparently soft water in its natural form was even worse. It was presumed that the Author's reference to soft water meant artificially softened water.

Mr. Fowler's opinion was asked in connection with the fitting of safety valves on domestic coke boiler installations. Many installations had no safety valves at all, it was stated, and relied solely on the expansion pipe. Others had safety valves fitted on the flow pipe; but the view was expressed that the safety valve should be fitted on the boiler itself.

An interesting suggestion was made for the coke boiler installation which was only used continuously during the winter months. This involved the fitting of an additional return pipe, with valve, at a point half way up the storage cylinder, so that by operating the valve only half the storage cylinder was used and a quick supply of hot water to this extent could be obtained.

Flues for Coke Boilers.

The question of flues for coke boilers was also discussed at some length, and reference was made to the fact that many of them would have experienced the disadvantages of metal flues, which might lead to very serious trouble. Condensation from the flue often flowed back on to the damper, which became corroded and frequently useless. Cases were known of chimney dampers thus becoming fixed in the closed position, so that the whole of the products from the coke fire escaped from the boiler into the room. And troubles of this nature were frequently attributed to the coke itself. It was emphasized that if external metal flues were used they should be partly lagged. This was not difficult to carry out because wooden casing could be made to fit round the flue and could be packed with some form of insulating material.

Mr. Fowler had pointed out the importance of limiting the maximum temperature of the water circulation in the hot water supply system, and it was suggested that 120° was sufficient for all purposes; but they all knew that it was liable to heat up far beyond that point—even up to boiling point. In ordinary installations, it was pointed out, there was no means of telling the temperature of the water. Sometimes a T piece was fitted, into which was inserted an ordinary bulb thermometer. But quite frequently that thermometer was damaged. It was very easily damaged, in fact. The case of clip-on thermometers on the flow pipe was also instanced, this comprising a dial thermometer, which, although not quite accurate, was stated to be a sufficient indication for the purpose of preventing overheating. This was a fitting which should be recommended wherever possible to guard against corrosion.

It was further stated that safety valves were the exception rather than the rule on ordinary domestic boiler installations, and one speaker observed that personally he had never heard of one coming into operation; nor had he heard of any damage ever being caused through lack of a safety valve. Mr. Fowler was therefore asked what importance he attached to such safety valves, as it was a question the coke salesman was often asked by consumers, and the fitting of them cost money. As regards the type of safety valve it was suggested that the dead-weight type was reliable, but that the spring-loaded type was liable to become fixed.

Asbestos and Insulation.

The opinion was expressed that asbestos was not an efficient insulator. The Fuel Economy Committee of the Federation of British Industries, it was stated, went into this matter very deeply and pointed out, among other things, that while asbestos formed an excellent resistance to heat it was not a good insulator, and one must therefore be careful in recommending it as an insulating material. Soot deposit on a hot surface came third on a list of insulating materials on which asbestos was No. 30—which indicated the comparatively poor value of the latter as an insulator.

An important point was raised in the question as to whether the flues from coke boilers were usually in direct contact with the open air or whether they usually ran into existing chimneys, cases of severe down-draught being instanced in connection with certain installations. Mr. Fowler was also asked how to calculate the boiler requirements for varying numbers of radiators, while he was questioned in regard to his advocacy in one part of the Paper of rather large boilers when later on in the Paper he had stressed the necessity for small boilers in conjunction with the storage tank.

It was suggested that it was important to be able to make some reliable answer to the consumer's enquiry as to how many additional radiators his existing boiler installation would take —particularly when it was not possible immediately to discover the run of the piping. It would be valuable to have some typical example to work on in cases of this description.

Mr. FOWLER, in replying to the points raised, said that the Bank of England was the only installation he knew of in which copper pipes were used, though it was usual to use light-gauge copper for water services. The two best English text books were by Barker and Coleman, while there was a comprehensive American work on the subject by Harding and Willard, though the facts given in the latter should be used with care, as they naturally referred to American practice.

He went on to explain the paragraph in the Paper regarding the effect of a room facing north-east. In time, he said, the window frames would shrink and allow a leakage of cold air to enter the room when a north-east wind was blowing. This was the coldest wind, and the effect was to tax the heating installation severely at a time when there was already a heavy load on it. The insulation figures he had given in the Table were practically the same for both heating and hot water supply systems operating at normal temperatures. They were near enough for water temperatures of 150° to 160° with a surrounding air temperature of 60°. But when they came to high-temperature steam his remarks on pipe coverings would have to be modified. In such cases moulded cork gave the best results. The most efficient insulating materials were those with small enclosed self-contained air spaces.

Corrosion.

As regards corrosion, Mr. Fowler said that if steel pipes were used for soft water such as was obtained from wells severe rusting would occur, accompanied by discoloration. Galvanized piping would usually be satisfactory for houses in the suburbs. The water drawn from below the chalk in the London district was the most corrosive. He went on to observe that safety valves should be fitted on the boiler if at all; he agreed that he also had never heard of one coming into operation on a small domestic boiler.

The question of calculating the number of radiators which a boiler would supply was a very difficult one. The makers' catalogues would probably provide the best answer. The average sized room with two windows would probably require about 35 sq. ft. of radiating surface. If the radiator sizes were added up and 25% was added for the mains a fairly accurate figure for the boiler rating could be obtained. He would suggest a figure of 14 sq.ft. of radiating surface per 1,000 cu.ft. of room. Back boilers, he observed, were similar in operation to domestic boilers, and the principles of the domestic boiler could be applied.

As regards the question of flues, Mr. Fowler said that these were not normally connected direct to the open air. If they had to go straight into the open air unless they were well insulated down-draught would occur. The termination of the flue should be well above the roof ridge of the house, while a duct from the open air let into the base of the chimney would help. In regard to the boiler size, he recommended ample size of boiler for a heating installation, while for hot water supply he advocated an ample size of storage cylinder fed at a steady

rate by a comparatively small boiler. The valving off of half the storage would serve very well on a large installation. He would emphasize, however, that his recommendations for a large storage cylinder applied to the £1,500 type of house, where there was perhaps a little more money available for superior equipment.

The L.C.C. supplied a dial thermometer screwed into a T piece on the flow pipe. This was easy to fix and was more accurate than many of the graduated types.

Further questions followed, and Mr. Fowler was asked for his views on the sizes of coke recommended for various purposes, a case being instanced of a commercial steam boiler failing to maintain sufficient steam pressure with the coke. It was found that large coke was being used, whereas the makers usually specified nuts. It was suggested that there were divergencies in the sizes of cokes supplied by various gas undertakings under the same names.

Standard Coke Sizes.

At this stage the Chairman interposed that the gas undertakings in the area of the London and Counties Coke Association should have adopted the Association's standards in regard to the sizes of their coke.

Another speaker said that his undertaking recently had to install a coke boiler system in a hospital where the water was very hard and to maintain the temperature at 180°.

Mr. Fowler remarked that thermostats were available for control on all but the smallest boilers. In the case of a hospital he would recommend the use of a water softener. The behaviour of various sizes of coke depended upon many factors, including the flue and the draught. The salesman could only follow the Association's recommendations, which had fairly wide limits. They were purposely designed so as to be suitable for the various types of coke boiler manufactured.

In reply to a question as to whether he advocated retarded circulation and a lagged system with the large cylinder, Mr. Fowler stated that the cylinder should be lagged in any case; but the retarding of the circulation would lead to greater frictional resistance to the smaller pipes, which was going to result in the deposition of chalk.

A further question was raised as to whether there was any information available as to standard sizes for fire bricks, as considerable difficulty was often experienced by reason of the many different types of brick for similar grates. It was stated in reply that there was no definite standard brick in existence; but the Builders' Merchants' Association were endeavouring to standardize certain sizes. Most makers followed what was called the "Builders' Brick." There were too many incidental manufacturers of fire bricks to allow of any standards becoming British Standards.

Another speaker pointed to the objection of the coke boiler being opened in the evenings for several hours for the maid to sit in front of—which upset the operation of the boiler. It was suggested that some supplementary form of heater for the kitchen should be provided to obviate this—such, for instance, as a small radiator fitted on the flow pipe of the boiler.

The meeting concluded with hearty votes of thanks to Mr. Fowler for his Paper and to the Chairman for presiding.

Wandsworth Company's Special Order Enquiry

(*Concluded from p. 827 of last week's* "JOURNAL.")

Mr. RONCA said he was satisfied that many people, even in the Gas Industry, did not quite appreciate what a differential was in principle.

Mr. *Valon* said that the difference between the cost of supply in the inner area of an undertaking and in the new area was the differential. In this particular case the proposed differential was based on the actual extra cost of supplying Leatherhead, and he had given Leatherhead an allowance representing the reduced cost of manufacture at Wandsworth; but he did not think that in all cases one was bound to do that.

Mr. ABADY held that in this case, as the Wandsworth Company sought mandatory power to charge 4·6d. per therm more in Leatherhead than in Wandsworth, it must show that it would cost 4·6d. more per therm to supply in Leatherhead than in Wandsworth. One would have thought that the Company would have offered some justification by figures that the cost of supplying in the part of Leatherhead which it now proposed to acquire would be 2·4d. per therm more than in the adjacent Epsom and Ashtead area of the Wandsworth Company. They did not even know the cost at Epsom. Unless the figures were subject to the gravest suspicion, as he suggested they were, the Company would have attempted to justify the extra 2·4d. It was for the Wandsworth Company to justify the proposed differential in Leatherhead, but they had not done so.

Developing Districts.

With regard to the point that it cost money to develop districts, he said that the mains were laid in the developing areas in Leatherhead, which were developing very rapidly. It was not right to accept the principle of giving the Wandsworth Company power to charge a permanent differential which could not be decreased except by means which Mr. Evetts had admitted were very difficult to put into operation. The Urban District Council submitted that there should be no longer any justification for two different prices in the same urban district, and the Order should be amended to provide that the price charged in the parish of Ashtead should not be exceeded in the remainder of the urban district. That suggested that the differential should not be more than 2·2d. above the Wandsworth price. But the Council wished to be perfectly reasonable; and if the differential of 4·6d. were authorized in Leatherhead, it should apply only for the first year, after which there should be a gradual reduction. He suggested that in each of the following four years there should be a reduction of 0·2d., so that at the end of the four years the differential should be 3·8d.; thereafter there should be an annual reduction of 0·4d., in four successive years, so that by 1944 the differential would be 2·2d., as in the Epsom and Ashtead district of the Company's area. The price of gas would then be 10·2d., assuming that the price in Wandsworth itself remained at 8d.

After the differential in Leatherhead had been scaled down, there should be facilities for revision similar to those applying in the Epsom and Ashtead district. If that suggestion were not adopted, he asked that the differential be made permissive and not compulsory, and that there should be proper provision for the preservation of the information which should be furnished to the Urban District Council as the basis for an application for price revision.

Mr. GOODRICH, for the Surrey County Council, said the Council considered that in one or two small respects the Order did not give full advantage to local consumers; and that it would prejudice the County Council in its operations.

Revision of Differential.

The Council's suggestion that the differential in Leatherhead should disappear gradually would not affect prejudicially the interests of consumers in other areas. It was held that there should be no attempt to fix any minimum limit to the differential; the Board of Trade, which had to authorize any reduction, would be the safeguard against too great a reduction.

The County Council was not asking that new restrictions should be imposed, but that it should retain the right that it had already in this area, under the Leatherhead Company's Act, to supervise the work of the Company on the roads in the area. The County Council had not in the past charged the Company for supervision of road repairs, and had not damaged the Company's mains by steam rollers. The Council had protective clauses in 11 gas Acts and 10 water Acts; and in four gas Acts it had the right of supervision.

Mr. LEES said there were cases where these special rights had been conceded by agreement between the parties, but he challenged Mr. Goodrich to cite a single contested case in which Parliament had given the Council those rights.

Mr. GOODRICH replied that he could not mention a contested case in which they had been given. On the other hand, he did not think a case could be cited in which protective clauses given under an Act or Order had been taken from the Council as the result of amalgamation of undertakings. It would be inequitable that protection which it had already should be taken away now. There were 1,400 miles of roads in the county, and the Council considered that it had a better knowledge than the Company as to the way in which those roads should be taken up and reinstated.

Mr. F. EDWARDS (for the Esher U.D.C.) contended that that Council should retain the protection it had already with regard to main roads and bridges. With regard to the prices of gas, there would be two differential rates in different parts of the Council's district. That was not unusual, but the Council considered that the proposed Leatherhead differential should be abolished, or, alternatively, that it was excessive.

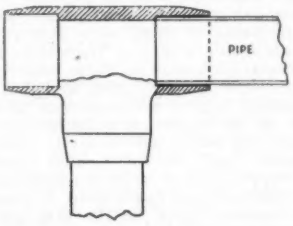
Mr. LEES said that the Leatherhead U.D.C., not the County Council, was the authority to look after the interests of the consumers in Leatherhead. If it could be shown in the future that the extra cost of supplying gas in Leatherhead as compared with Wandsworth was less than 4·6d., application could be made for reduction of the differential. That was eminently fair.

A road authority did not require more powers than were given by the general law. It gave them powers to superintend the road work carried out by the Gas Company, but it did not make the Gas Company pay for that superintendence. The special protection which the County Council had already was limited to little more than two parishes. The Wandsworth Company could not take over that liability.

Modern Jointing for Copper Gas Pipes

The subject of copper piping for gas carcassing work has come in for considerable discussion in recent times. The particular advantages claimed for it may be stated briefly to be as follows: It is completely free from scale and is not subject to deterioration of any kind. It is light and extremely neat in appearance, and therefore represents a type of pipe combining these advantages with a lifetime of service equivalent to that of the house itself.

The disadvantage of copper in the past has been its cost. This was partly due to the high price of the material itself, and partly to the expensive nature of the jointing methods used for its installation. But it is now claimed that the low price of copper which has ruled for some time past, together with the introduction of new jointing methods, have entirely revolutionized the cost aspect.



The makers of "Endex" fittings call our attention to their very simple system. All that is necessary is to insert the pipe into the socket of the union up against a "distance stop," heat the socket, and apply solder wire to the mouth of the socket when it is liquefied and drawn up into the fitting by capillary attraction, completely filling the space between the socket and the pipe and producing a perfectly gas-tight joint of remarkable resistance to strain.

"Endex" fittings are specially produced for the Gas Industry, and the following are a few of the main points which the makers claim render them particularly suitable for this purpose:

(1) All fittings are most carefully designed internally to give a stream-line formation and total absence of right-angle corners.

(2) The internal and external finish has been brought to a very high standard by special methods, with a view to eliminating friction internally and presenting as attractive an appearance as possible externally.

(3) By a series of careful operations the inside of the fitting is completely cleared of any traces of sand or loose material of any kind.

(4) The sockets of all fittings are made to very close limits of accuracy so as to ensure efficient capillary action.

(5) Every fitting is tested by compressed air under water at a pressure of 150 lbs. per sq.in.

(6) All male screws are tapered and female screws are carefully adjusted to prevent any possibility of butting between the end of a male screwed member and the shoulder at the bottom of a female thread.

(7) A full range of detachable union-couplings are available.

(8) The reduction from one size to another of all tees, bends, &c., is effected by reducing the body of the fitting itself and involves the use of no loose parts.

(9) The fittings are available in all sizes $\frac{1}{8}$ in. to 2 in. in a very wide range of patterns covering every requirement of the Gas Industry and are made in high-quality hard brass. They can be provided either in a cast finish or polished or chromium plated.

The "Endex" fittings are made by Messrs. Fyffe & Co., Ltd., Riverside Brass Works, Dundee, and the distributors for the Gas Industry are Messrs. Abbott, Birks, & Co., 90/91, Blackfriars Road, London, S.E. 1.

Davis Gas-Furnace Burners

The efficiency obtained in the application of gas to industrial operations necessarily depends to a large extent upon the burners used, and the thorough manner in which science has been applied in every detail of their design. In the design of the new Davis burner particular attention has been paid to scientific detail, and its use is of the utmost assistance in the efficient application of gas to many industrial and other operations.

Indeed, so remarkable is the performance of the Davis Gas-Furnace burner that a large and increasing demand is being experienced for application to industrial apparatus of other than Davis construction.

Davis Gas-Furnace burners are of three types:

1. Self-Intensifying.—A highly-comprehensive and readily adaptable series for use with town gas, high-pressure gas, or gas in association with fanned air.
2. High-Power Ring.—A specially-constructed ring burner in three useful sizes, for the same general uses as the Self-Intensifying Burners, but for application where burners of the ring type are more appropriate than the Self-Intensifying design.
3. Air Blast.—Four sizes of the same scientifically constructed mixer, for the maximum utilization of the heat units in gas consumed under air blast.

The Self-Intensifying pattern operates with gas pressures from $1\frac{1}{2}$ in. to 20 lbs. per sq. in. and is suitable for natural draught furnaces. The burner is constructed to generate a very highly aerated and intimately associated mixture, the burning of which results in the development of an intensely powerful flame. The special grating by which the mixing is accomplished provides also a means of preheating the secondary air necessary to complete combustion, thereby intensifying the flame and correspondingly reducing the consumption of gas necessary to maintain the full working temperature of the furnace. With town gas at ordinary main pressure Type No. 1 burner is suitable for temperatures up to 900° C., or even 1,000° C. Using high-pressure town gas temperatures up to 1,300° C. may be obtained, or, with ordinary main pressure town gas and an auxiliary fan pressure of air up to 6 in. water column, for temperatures up to about 1,150° C. For use with a fan the burners require modification and are extremely useful where the pressure in the gas mains falls below the usual 2 or $2\frac{1}{2}$ in., as when working with a fan-air pressure of (say) 6 in. the actual pressure of the gas is not of material importance, provided, of course, that the quantity is sufficient.

The High-Power Ring pattern burner is suitable for use with gas at ordinary main pressure and therefore does not require the use of any compressing plant. The construction embodies a special mixing grating which ensures the intimate association of a large proportion of air with the gas, this highly aerated mixture producing high flame temperatures with a relatively economical consumption of gas. The burner is made in two cast-iron parts held together by four screws, and in complete form presents a very compact appearance. The larger casting comprises the air injector, mixing tube, and atomizer. The atomizer is formed by casting a number of bridges across the annular gas way, an arrangement by which the gas stream is finely divided to ensure the proper mixing of the air and gas. These bridges, moreover, do away with the necessity for any form of wire gauze or other fragile grating. Fitted on to the main casting is a U-shaped cast-iron ring, in which are drilled the necessary flame holes. The joint being a metal to metal contact, packing—with its liability to give trouble—is entirely dispensed with.

The Davis Air-Blast burner for use in air-blast furnaces is particularly suitable for operations in which very high temperatures or great concentration of heat is required and may be used to advantage with air pressures of from 2 lbs. to 7 lbs. per sq. in. induced by means of a rotary compressor. There is no doubt that in the design of their Air-Blast burner, the Davis Gas Stove Company have duly regarded the two essential features of an efficient burner of this type—viz., a readily manipulated gas and air regulator, and an intimate admixture of gas and air in order that the advantages of the air pressure may be fully utilized.

The Davis Gas Stove Company, Ltd., The Diamond Foundry, Luton, have recently published a booklet dealing with these burners and their many applications.

Gas Consolidation, Ltd.

Major Day's Survey at the General Meeting

The first Annual General Meeting of Gas Consolidation, Ltd., was held at Winchester House, London, on Monday, June 24. Major Julian Day, M.C., the Chairman, presided, supported by Mr. Hugh C. Bischoff, Major-General Guy P. Dawnay, Mr. George Evetts, M.Inst.C.E., M.I.Mech.E., M.Cons.E., Mr. G. M. Gill, M.I.Mech.E., M.Inst.Gas E., and Mr. H. E. Ibbs, Directors.

The Chairman said:

The Report and Accounts covering the period ended May 31, 1935, have been in your hands for some days, and with your permission I will take them as read.

This Company was incorporated on June 28, 1934. It was formed with objects rather broader than those of some of the other Holding Companies in the Gas Industry, for Gas Consolidation, Ltd., does not aim to be a geographical Holding Company along the lines made familiar through South-Eastern Gas Corporation and Severn Valley Gas Corporation, but rather to facilitate and be concerned in the creation and support of such geographical Holding Companies. Thus, among the first important transactions of the Company was the acquisition for cash at par of £99,000 of the Deferred shares of Severn Valley Gas Corporation. That Company was formed in March, 1934, and the Deferred shares were privately subscribed for cash at par. The first subscribers sold their holdings to this Company at cost and subscribed the first issue of capital of £200,000 Ordinary shares of this Company for cash at par with a view to participating in the wider activities of this Company.

Function of Holding Companies.

The development of these Holding Companies in the Gas Industry is a topic which has been much discussed. The Founders of this Company are associated with the activities of only two such Holding Companies—namely, the two above referred to. South-Eastern Gas Corporation is operated under the ægis of the Gas Light and Coke Company, and while there is no connection between South-Eastern Gas Corporation and either Severn Valley Gas Corporation or this Company, the procedure and aims of the last two follow closely on those initiated by South-Eastern Gas Corporation. That these aims and this procedure are beneficial to the great body of consumers of gas and contribute to the successful and prosperous growth of the Gas Industry in general is the confident belief of an ever growing body of those who devote their work to the Industry.

In forming a geographical Holding Company, by which I mean a grouping of gas undertakings in one area, it must be apparent that the first steps to be taken present the greatest difficulty. A beginning must be made, and in order to establish a satisfactory nucleus for a proposed group it is necessary not only for capital to be forthcoming, but also to secure at the outset the services of a group of individuals with the necessary qualifications willing to devote their time to the guidance of the enterprise. From the start there must be a form of organization capable of bringing about harmonious co-operation and co-ordination between the companies which eventually become members of the group, thereby achieving the economies and other benefits obtainable.

It is possible that individuals will join together to do all these things and carry them through successfully, but the Founders of this Company believe that these functions can be more readily and efficiently fulfilled by a corporate body such as this Company which maintains an organization created for the purpose. Experience in one formation aids in each succeeding formation, and association with the management of one geographical Holding Company is of inestimable value in guiding the affairs of other such Holding Companies. It may be argued that one general non-geographical Holding Company is to be preferred to several separate geographical groups, but my colleagues and I do not believe this to be true. On the contrary, we believe that each geographical Holding Company should include on its directorate men intimately connected with its particular area. And the farther the area lies from London the greater the need of resident personnel in each group.

The investment of this Company in shares of Severn Valley Gas Corporation was not intended to be for purposes of control, but rather to establish harmonious relations between companies in the Severn Valley group and other companies or groups with which this Company is now or may in the future be concerned. The conception is that each geographical Holding Company should operate independently, but through association with this Company co-operation on broad lines may be brought about between the several groups. Regarded as an investment only we are well satisfied with the purchase of the Deferred shares in Severn Valley Gas Corporation at their par value. An initial dividend at the rate of 5% per annum has been paid, and we look forward to the maintenance of this dividend as a minimum and in due course to its increment. The companies in the Severn Valley group include some of the soundest gas undertakings in England and their continued prosperity seems well assured.

In pursuance of the same objects, majority interests have been acquired in three contiguous gas companies in the Midlands—namely, the companies situated at Tamworth, Lichfield, and Cannock. No one of these companies is of sufficient size or importance to be regarded as the nucleus of a new group, but the three together may serve that purpose in the fullness of time, or they may become allied to other companies in the same general area with that end in view.

If time permitted I should very much like to give you a sketch of all that has been done to improve the operating results of these companies in the brief period which has elapsed since majority interests in them were acquired. I must content myself by informing you that reductions have been made in the prices charged for gas in all three undertakings, that important economies have been effected, and that much has been accomplished tending to give better service and to increase the demand for gas by all classes of consumers in the area. We are confident that this policy will assure to each of these undertaking a prosperity built up on a high standard of service coupled with a supply of gas at as moderate prices as circumstances permit under efficient operation. The satisfaction of the great body of consumers must be the first aim, leading to an ever growing consumption of gas.

New Hire-Purchase Finance Service.

Apart from our interests in Gas Holding Companies and our investment in subsidiary operating Companies, we have established a service organization available to any gas company or undertaking whether or not we have any interest therein. There never was a time, I think, when there was so great a need of a service organization conducted with the purpose of providing services not otherwise readily obtainable by the large number of relatively small gas undertakings in this country. In the early days of gas, and during the period when much of the legislation which still governs gas companies was passed, the important part to be played by gas appliances was probably not realized, and it is only in recent years that a demand has arisen for the supply of a large number of costly appliances on terms of gradual payment over a period of years if not on simple hire. Many gas undertakings are reluctant to increase their capital by relatively large amounts in order to give to their consumers the opportunity of acquiring these appliances by gradual payments. Those who understand the limitations imposed on capital issues of statutory gas undertakings and the technical restrictions in that connection will understand the reluctance of many Boards of Directors to devote any substantial proportion of the funds at their command to the purpose of supplying fittings except for cash payment. Yet it is generally recognized to-day that a time has come when a very large percentage of all the appliances in use ten years ago must be replaced by the more attractive and more efficient modern fittings, and that each year new apparatus is being produced, the use of which adds greatly to the satisfaction of gas consumers and hence increases the consumption of gas, thus adding to the prosperity of each local gas undertaking. In creating arrangements, therefore, whereby Gas Consolidation can offer to any gas company or undertaking financial facilities which will permit the supply of appliances on a system of gradual payments to consumers in each area with profit to the local company and yet, without drawing on its capital requirements, we are offering a service which will be availed of and appreciated by an ever growing number of companies and local authorities. This is but one part of the service organization which we are establishing. In a Company such as this, with which are associated a group of technical advisers of long experience and high standing in the Industry, coupled with financial resources, we are in a position to render services to undertakings in connection with any approved scheme for extending their operations. We invite enquiries along either of these lines from gas undertakers in England or Wales, and we look for the co-operation of manufacturers in our efforts to make as general as possible the use of the most up-to-date and efficient gas appliances.

Good Results Foreshadowed.

With regard to the financial results to be anticipated, it was stated in the Prospectus published in May last, that in a full year the income from present investments at current rates of dividend *plus* other Revenue now being received, and allowing for the use of the additional funds provided on a basis to produce a yield of 4½% per annum only thereon, would be sufficient to show annual net profits equal to rather over 5% on the Ordinary Shares. The net profits for the period under review are not to be taken as a criterion in this respect, for the period is a broken one in which we have held our

investments for a time longer than that in respect of which dividends have been received. The published estimate of future income takes no credit for any profits which may result from the service organization alluded to, yet these may well prove of growing importance, and any profits accruing from this source should increase our Net Revenue *pro tanto*. It is our expectation that net profits will permit the payment of a dividend at the rate of not less than 5% per annum on the Ordinary Shares.

Balance-Sheet Position.

In the Balance-Sheet, on the Assets side, the investments in Subsidiary Companies and in Deferred Shares of Severn Valley Gas Corporation, to which I have alluded, are shown at their cost price, £312,928. There are small balances owing from Subsidiary Companies on Current Account of £708; Sundry Debtors are £136, and Cash at Bank, £2,777.

The total Formation and Other Expenses are set forth amounting to £12,563. I call your attention to the fact that the expenses attaching to the first issue of £200,000 of Ordinary Shares at par were limited to Capital Duty, £2,500, and Sundry Preliminary Expenses of £160 only. The other Expenses were in connection with the recent issue of Capital to which I have referred. From this total of £12,563 there has been deducted the amount standing to the credit of Share Premium Account —namely £5,000, which was realized by the issue of £50,000 Ordinary Shares at a premium of 2s. per share. The net amount shown in the Balance-Sheet is £7,563.

Of the issued Capital of £500,000, the amount called up at the date of the Balance-Sheet was £312,500, leaving £187,500 to be received. Of this amount, calls paid in advance at the date of the Balance-Sheet are shown as £3,148. Sundry Creditors are £2,070, and the balance of Revenue Account is £6,395.

The Revenue Account shows that the actual dividends received during the period, less tax, amounted to £6,878, and the Directors' fees of Subsidiary Companies, which are payable directly to the Company, amounted to £1,402. Other Income over the period came to £493.

On the Debit side the provision for Directors' fees of this Company amounted in the period to £353, which is but a small proportion of the amount which the Company has received for the services of its representatives on the Boards of Subsidiary Companies. Secretarial and Other Expenses at £598 have been maintained at a low level. For some considerable part of the year prior to the recent issue of Capital, the Company was borrowing money and on balance the amount paid in interest on such loans was £1,373. The balance, subject to the dividend which has been recommended to this Meeting on the fully paid Ordinary Shares, is £6,395, as shown on the Balance-Sheet and in the Directors' Report.

The Accounts cover a period of less than a year and, as explained, it is anticipated that a full year's period will show a higher rate of profit on the enlarged capital.

The Report and Accounts were unanimously adopted.

Gas Undertakings' Results

Brighouse.

The yearly report of the Brighouse Gas Undertaking for the year ended March 31, 1935, states that the gas sent out during the year amounts to 225,393,000 cu.ft., being 8,751,000 cu.ft. more than last year, an increase of approximately 4%. The gas sold and used is 218,403,300 cu.ft., being 3,640,000 cu.ft. more than last year, an increase of 1·7%. The gas unaccounted for is 6,989,700 cu.ft., which is 3·1% of the output. This is slightly higher than the average over the last few years. Automatic meter consumers have taken 80,037,500 cu.ft., being 832,500 cu.ft. less than last year. The average slot meter consumption during the year was 18,079 cu.ft. as compared with 19,300 cu.ft. last year. The slot consumption figures and the figures for gas unaccounted-for are normal figures this year, but they suffer in comparison with last year's figures owing to the effect of the changes in the number of meter readings made annually which, as stated in last year's report, affected last year's figures favourably. The average make of gas per ton of coal carbonized was 14,150 cu.ft. This includes 679 cu.ft. as the equivalent of benzole removed. Residuals have yielded 74% of the cost of coal as compared with 64·9% last year. This happy result is due to several circumstances—cheaper coal, better prices for tar and coke, and greater production of benzole in the enlarged plant. Wages amounted to £9,174 9s. 6d., against £8,981 2s. 1d. last year. The average price received per 1,000 cu.ft. was 30·46d. The purication plant was improved during the year by the installation of two large purifiers in place of two old purifiers. No further extension in this portion of the plant will be required for some years. A new coke-handling plant has been installed during the year. This is doing all that was hoped of it in the way of saving in running cost and improved quality of coke.

Dewsbury.

Dewsbury Corporation Gas Department for the year ended March 31, 1935, yielded a gross profit of £23,950 compared with a gross profit of £17,718 the previous year. The cost of manufacture has been reduced from £26,989 to £24,500 and distribution expenses have been reduced from £11,491 to £7,516. Sales of gas and residual products yielded £67,215, including £2,500 from the sale of motor spirit. The net profit is £5,661. The Undertaking inform us that their two-part tariff scheme for all domestic purposes is now in operation with a commodity rate of 3d. per therm.

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(BRANCH OF METERS LTD.)

OUR MAIN TAPS
ARE UNSURPASSED
FOR QUALITY.

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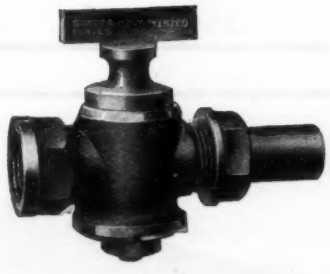

No. 119.

Makers of

ORDINARY . . . .
PREPAYMENT . . .
TWO-COIN . . . .
HIGH CAPACITY .

METERS

DERBY ROAD
WATFORD
PHONE: 2645
GRAMS: 2645 SAWER, WATFORD

RADFORD ROAD
NOTTINGHAM
PHONE: 75202
GRAMS: SAWER, NOTTINGHAM

MILES PLATTING
MANCHESTER, 10
PHONE: COLLYHURST 2289
GRAMS: SAWER MANCHESTER

This pre-cast Lead Ring

cuts out run lead and caulking

Using a spanner as his only tool, an unskilled workman can make the Stanton Mechanical Lead Joint in a fraction of the time which it takes a skilled hand to run lead into and caulk an open socket joint. A pre-cast lead ring is slipped over the spigot, two half-collars are placed in position, and the jointing operation is completed by the tightening of four cast-iron set-screws.

Inside the lead ring is cast a corrugated steel spring insertion ring, which uniformly distributes the end pressure so that the joint is effective throughout its full depth—and not for a portion only as in a caulked joint. The ring is mechanically held in position and cannot be dislodged by "drawing" of the spigot.

PATENT No. 404955
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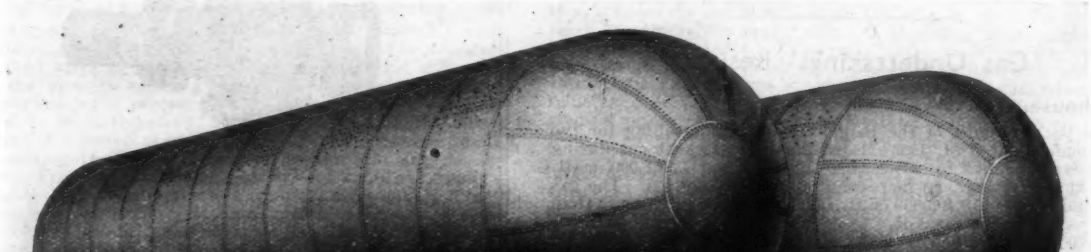
STANTON MECHANICAL LEAD JOINT

THE STANTON IRONWORKS COMPANY LIMITED, Nr. NOTTINGHAM



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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

In view of the end of the Account last week it was not surprising that the recent large appreciations in the Industrial section should bring about a substantial number of profit-taking sales, and this in turn brought down values. The confidence in this market was such, however, that by Friday, when the movement had subsided, buyers were soon in evidence and prices quickly responded. Gilt-edged securities were steady throughout, and the majority showed fractional gains on the week. The recent issues of 3% stock at 99 by the Birkenhead, Cardiff, and Manchester Corporations all closed at a premium, and it will be interesting to see the result of the current week's issue by the Leeds Corporation of £4,000,000 3% stock, 1955-1958, at 99½.

In the Gas Market the number of recorded transactions was a little less than the previous week, though prices generally remained firm. There was a continued demand for European stock, the quotation closing 3 points higher at 175. On the local Exchange, Bristol ordinary was marked up 1 to 122, while the 5% debenture hardened 3 to 124. Imperial Continental was well supported, and the price margin narrowed to 5 points at 215-220, leaving a fractional gain on the week. The only set-back of note was a further drop of 4 points in South Metropolitan ordinary to 125½, at which price the yield, based on last year's dividend of 5¾%, works out at £4 11s. 7d.%.

In response to the recent offer by the Swansea Gas Light Company, referred to in this Report published on June 12, it is announced that £59,989 6½% debenture stock has been converted into 3½% redeemable debenture stock, and £34,011 6½% debenture stock will be repaid on June 30, 1935. Allotments in respect of cash applications were, therefore, limited to this latter amount, which was considerably over-subscribed.

The Directors of the Cheltenham and District Gas Company, an undertaking controlled by the Severn Valley Gas Corporation, Limited, have recently issued £100,000 3½% debenture stock at £98% net, to be repaid at par on July 1, 1965, the whole of which has been taken up by Messrs. Panmure Gordon & Co., at this price. The stock will be transferable in multiples of £1, and a full six months' interest will be paid on Jan. 1, 1936.

Current Sales of Gas Products

The London Market for Tar Products.

June 24.

The Tar Products market remains steady, with prices at about the following levels:

Pitch, about 37s. 6d. per ton f.o.b.

Creosote, about 5¾d. to 6d.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 2d. to 2s. 3d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d.; and 90/160 pyridine, about 4s. 6d. to 4s. 9d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

June 24.

The average prices of gas-works products during the week were: Gas-works tar, 19s. to 24s. Pitch—East Coast, 33s. to 35s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 33s. to 35s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6¾d. to 7d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 5½d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 5¼d. to 5½d.; low gravity, 5d. to 5⅜d.; Scotland, 5d. to 5¼d. Heavy oils, in bulk, North, 4¾d. to 5d. Carbolic acid, 60's, 2s. to 2s. 1d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *June* 22.

Enquiries are quite numerous, but new business is not too plentiful. Values are about unchanged during the week.

Crude gas-works tar.—The actual value is 28s. to 30s. per ton *ex* works in bulk.

Pitch remains without interest, with prices nominal at 37s. 6d. per ton f.o.b. Glasgow for export, and 35s. to 37s. 6d. per ton *ex* works in bulk for home trade.

Refined tar continues to command 3d. per gallon f.o.r. makers' works in buyers' packages.

Creosote oil is in good call with supplies scarce and quotations firm. B.E.S.A. Specification, 5¼d. to 5⅜d. per gallon; low gravity, 5⅛d. to 5¼d. per gallon; and neutral oil, 5¼d. to 5½d. per gallon; all f.o.r. in bulk.

Cresylic acid.—While enquiries are more numerous there is little behind them. Pale, 97/99%, 1s. 1½d. to 1s. 2½d. per gallon; dark, 97/99%, 1s. to 1s. 0½d. per gallon; and pale, 99/100%, 1s. 2½d. to 1s. 3½d. per gallon; all *ex* works naked.

Crude naphtha.—Supplies are well looked after at 4½d. to 5d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is 10½d. to 11½d. per gallon.

Motor benzole is commanding 1s. 3d. to 1s. 3½d. per gallon in bulk at makers' works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade, 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole . . .	0	9½	to	0	10	per gallon at works
Motor ,, . . .	1	3	,,	1	3½	,, ,, ,,
90% ,, . . .	1	4	,,	1	4½	,, ,, ,,
Pure ,, . . .	1	7½	,,	1	8	,, ,, ,,

Contracts Advertised To-Day

Coal.

Ellesmere Port Urban District Council. [p. 890.]
Keighley Gas Department. [p. 888.]

Coke Screening Plant, &c.

Oswaldtwistle Gas Department. [p. 890.]

Condenser.

Blackpool Gas Department. [p. 888.]

Lanterns (Street).

Prestatyn Urban District Council. [p. 888.]

Oxide.

Keighley Gas Department. [p. 888.]

Painting.

Lytham St. Annes Corporation. [p. 888.]

Purifiers.

Blackpool Gas Department. [p. 888.]

Retorts.

Bexhill Gas Department. [p. 890.]

Tar Extractor.

Blackpool Gas Department. [p. 888.]

Washers.

Blackpool Gas Department. [p. 888.]

Trade Notes

"Simplex" Water Gas Plant for Kilwinning.

The Kilwinning Gas Company, Ltd., have placed an order recently with the Vertical Gas Retort Syndicate, Ltd., 17, Victoria Street, Westminster, for an improved type "Simplex" Water Gas Plant with automatic operator.

New Design Jacketed Vessels.

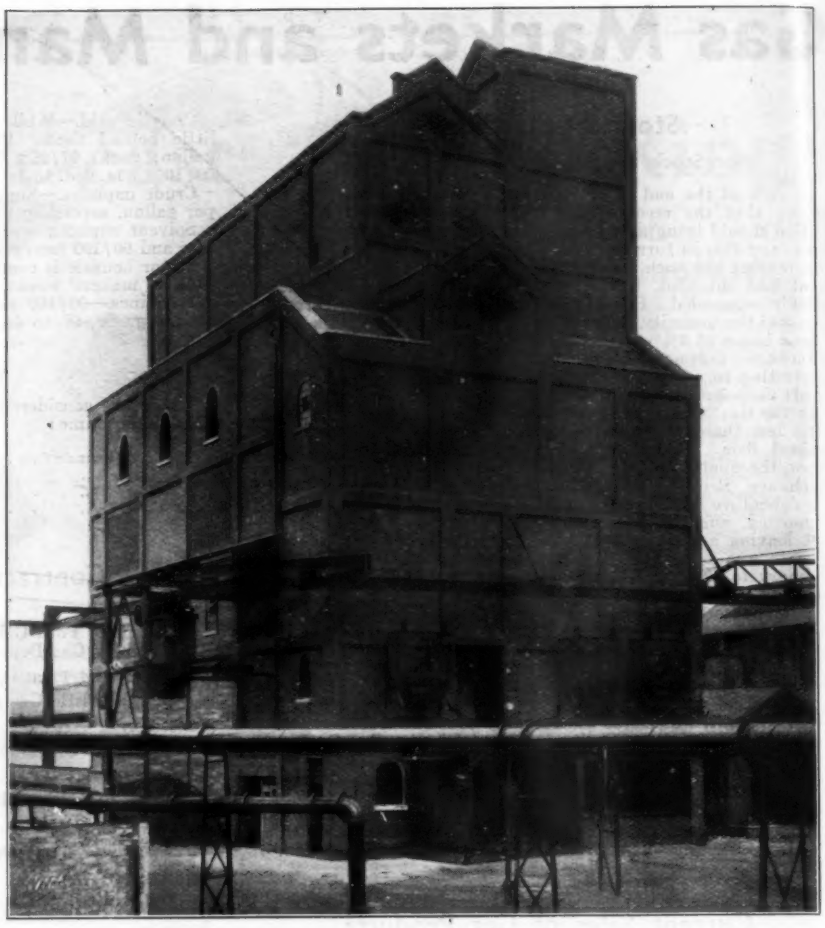
We have received from Messrs. Ashmore, Benson, Pease, & Co., Ltd., Parkfield Works, Stockton-on-Tees, a pamphlet giving some particulars of a new departure in the design of jacketed vessels. This incorporates the tubular stay (Patent No. 420,961) which has the following advantages: The inner shell is not perforated, stray leakage is eliminated, any defects in the stays are visible, the stays are obtainable in any size or shape, and the method of construction is very economical.

New Capital Issues

Redditch Gas Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender £25,000 of 4% redeemable debenture stock in this Company at a minimum price of par. Tenders must be received not later than 11 a.m. on Thursday, July 11.

Wolverhampton Gas Company.—As will be seen from our advertisement columns, the Directors of this Company are offering for sale by tender £30,000 of consolidated ordinary stock ranking for a standard dividend of 6%, subject to a sliding scale, equally with the issued ordinary capital which has received at least 7% per annum for the last twelve years. The minimum price of issue is £150 per £100 stock, and tenders must be received not later than 11 a.m. on Monday, July 8.

ILLUSTRATION: GLOVER-WEST VERTICAL RETORT PLANT RECENTLY BUILT FOR THE EAST HULL GAS COMPANY



●

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THE WEST SYSTEMS

FOR COAL CARBONIZATION AND RELATED PROCESSES

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WESTVERTICAL CARBONIZING CHAMBERS

BREEZE-BURNING PRODUCERS AND WASTE-HEAT RECOVERY PLANT
MODERN METHODS OF COAL & COKE HANDLING & TREATMENT

A MEMBER COMPANY OF THE

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING. LONDON: REGENT HOUSE, KINGSWAY, W.C.2

STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue. £	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, June 21.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,551,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	130—140	...	...
374,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,000	£1	Apl. 8	1/4½	1.9½	Bombay, Ltd.	27/6—29/6	...	...
178,480	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	220—230	...	229
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	167—172	...	172
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	147—152	...	150½
50,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	...	...
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	173—178	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	153—158	...	...
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	...
1,487,500	,,	Feb. 4	5	5	Bristol, 5 p.c. max.	121—123*a*	+1	..
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½*a**	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½*a**	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	123—125*a*	+3	...
855,000	,,	Mar. 11	7	8	British Ord.	154—159	—1	154
100,000	,,	June 7	7	7	Do. 7 p.c. Pref.	160—165*	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. "B" Cum. Pref.	112—117*	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100*	...	98½
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—114*	...	...
100,000	£10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	£10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Dec. 17	4½	4½	Do. 4½ p.c. Deb. ...	85—90	...	...
626,860	,,	Jan. 21	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	103—108*	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116*b*	...	...
98,936	£1	Mar. 25	2/-	2/-	Colombo, Ltd., Ord.	1⅞—1⅞	...	...
24,500	£1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/6—22/6	...	...
609,204	£1	Mar. 25	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	20/6—22/6	...	21/4½—21/7½
296,053	£1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	26/—28/-	...	26/6—27/-
1,775,005	Stk	Feb. 4	5	6	Commercial Ord.	105—110	...	105½—107
475,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	85—90*	...	86
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
807,560	,,	Feb. 18	7	7	Croydon sliding scale...	155—160	...	156
569,590	,,	,,	5	5	Do. max. div.	112—117	...	115½
620,385	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	125—130	...	126
542,270	,,	Feb. 18	7	10	Derby Con.	185—195*c*	...	...
55,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	100—105*c*	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c. ...	108—113	...	...
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	...
175,609	,,	June 7	5	5	Do. 5 p.c. Deb. ...	118—123*	...	...
1,002,180	,,	Mar. 11	‡	‡7	European, Ltd.	170—180	+3	170—175
19,313,481	,,	Feb. 4	5½	5½	Gas Light & Coke 4 p.c. Ord.	27 6—28 6*f*	...	27/6—28/-
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. ...	85—90	...	88⅜—90
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	106—111	...	107—110½
6,102,497	,,	June 7	3	3	Do. 3 p.c. Con. Deb. ...	87—92*	...	87—88½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	113—118*	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	109—114*	...	112½—113½
270,466	,,	Feb. 18	6	6	Harrogate New Cons. ...	135—140	...	...
140,000	£1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1½—1½	...	27/—27/9
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c.... ...	128—138	...	...
5,600,000	,,	May 13	10	14	Imperial Continental Cap. ...	215—220	+½	215½—219½
223,130	,,	Jan. 21	3½	3½	Do. 3½ p.c. Red. Debs.	91—96	...	...
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—185	...	180
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord.... ...	136—140*b*	...	...
245,500	,,	June 7	5	5	Do. 5 p.c. Red. Pref. ...	105—110*b**	...	...
306,083	,,	Jan. 16	4	4	Do. 4 p.c. Deb.	104—107*b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	83—88	...	...
75,000	,,	May 27	†10	†10	Malta & Mediterranean ...	210—220	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	106
360,075	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	125—130	...	...
125,000	—	Jan. 2	11/8	3½	Do. 3½ p.c. Rd. Rg. Bds.	99—102	...	...
675,000	,,	28 May '34	†6	†3	Montevideo, Ltd.	48—58	...	...
2,061,315	,,	Feb. 18	5	5⅞	Newcastle & Gateshead Con.	25 9—26 9*df*	..	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107*d*	...	...
776,706	,,	June 7	3½	3½	Do. 3½ p.c. Deb. ...	100—101*d**	—1½	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	115—120*a*	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	165—175	...	...
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110	...	...
300,000	,,	Apl. 29	†9	†7	Oriental, Ltd.	167—172	...	...
416,617	,,	June 7	8	8	Plym'th & Stonehouse 5 p.c.	162—167*	...	...
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	175—180	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	...
114,000	,,	Jan. 21	5	5	Preston 5 p.c. Pref.	108—113	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	142—144*e*	...	...
95,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	103—106*e*	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	142—147	...	...
90,000	£10	May 27	‡3	‡3½	South African	3—4	...	3½—3⅞
1,061,779	£1	May 13	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	27/—29/-	...	28/1⅛
845,016	£1	Mar. 11	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	22/—23/-	...	22/7½
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6½	South Met. Ord.	123—128	—4	124—128½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	104—109	...	...
1,895,445	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	87—92	...	88½—89⅝
1,000,000	,,	Jan. 7	5	5	Do. 5 p.c. Red Deb....	113—118	...	118¼
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176*d*	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	130—135	...	131—133½
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	123½
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	105—110	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb. ...	122—127*	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	102—107*	...	...
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	114—119	...	119
121,275	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105*	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	115—120	...	117½
200,000	,,	June 7	6½	6½	Do. 6 p.c. Red. Deb. ...	98—103*	...	...
1,076,490	,,	Feb. 18	6½	6½	Tottenham and District Ord.	148—153	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	133
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
199,005	,,	June 7	4	4	Do. 4 p.c. Deb. ...	101—106*	...	...
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c.	150—155	...	152
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	118—123	...	...
1,326,700	,,	Feb. 4	7	7	Wandsworth Consolidated ...	155—160	...	155—158
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	122½—124
1,317,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	124—129*	...	126
208,300	,,	,,	26/8	4	Do. 4 p.c. Deb. ...	102—107*	...	...
158,400	,,	Feb. 18	5	6*g*	Winchester W.& G. 5 p.c. Con.	116—121	...	...

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. *g.*—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

STOCK FOR SALE BY TENDER.

By Order of the Directors.
THE REDDITCH GAS COMPANY.

Messrs. A. & W. RICHARDS
are Instructed to OFFER FOR SALE BY TENDER

£25,000

FOUR PER CENT. REDEEMABLE DEBENTURE STOCK,
to be redeemed at Par at the Company's option on 31st July, 1955.
Minimum Price of Issue, Par.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Thursday, 11th July) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

By Order of the Directors.
NEW ISSUE OF CAPITAL.

WOLVERHAMPTON GAS COMPANY.

THE Directors Offer for Sale by Tender not exceeding

£30,000

CONSOLIDATED ORDINARY STOCK,
ranking for a Standard Dividend of 6 per cent., subject to a Sliding Scale, equally with the issued Ordinary Capital, which has received at least 7 per cent. per annum for the last twelve years.
Minimum Price of Issue, £150 per £100.

Prospectus and Form of Tender (which latter must be received by 11 a.m. on Monday, 8th July, 1935) may be obtained from the undersigned.
A. G. WILLIAMS,
Secretary.
Gas Offices,
Darlington Street,
Wolverhampton,
June 25, 1935.

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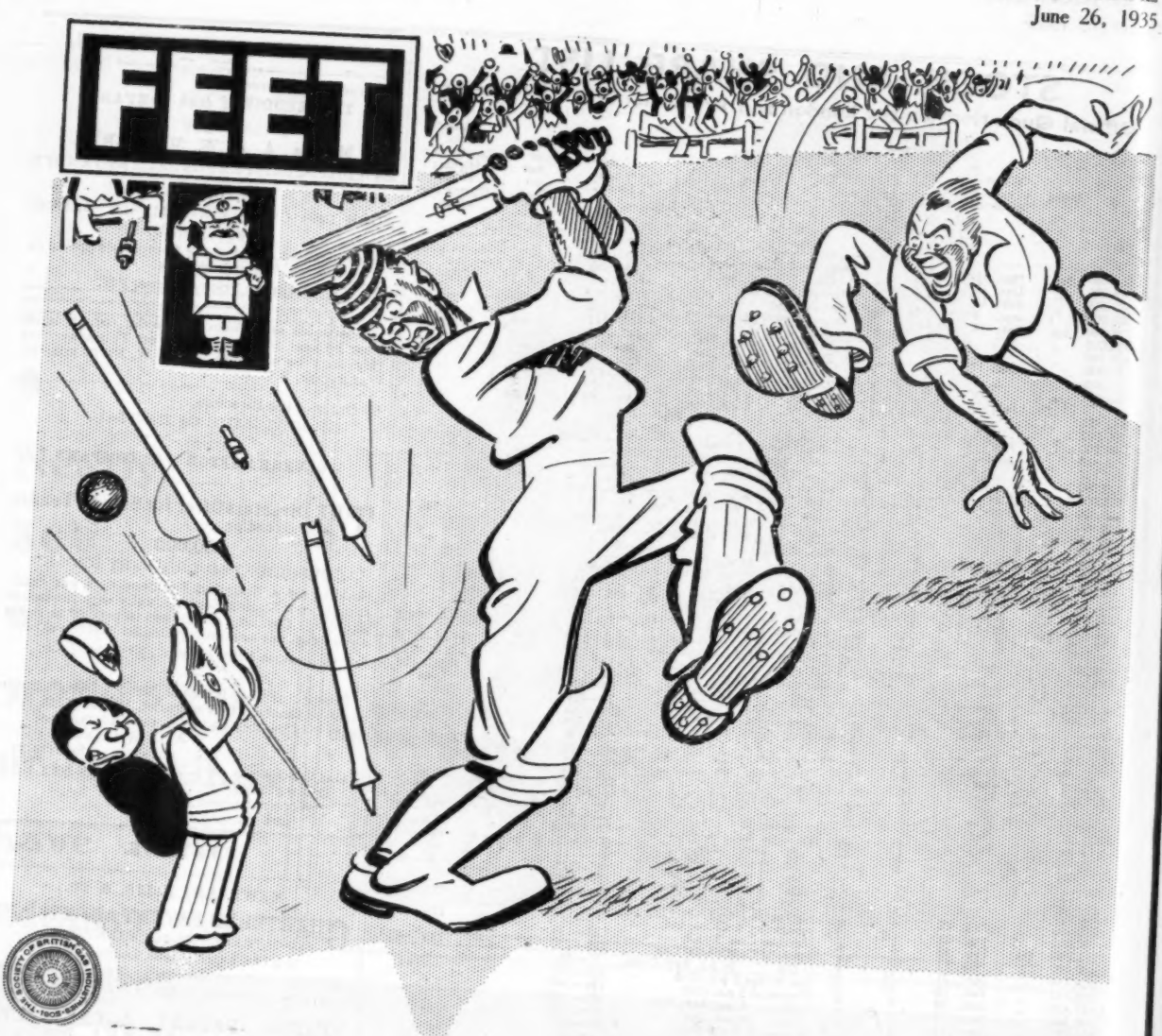

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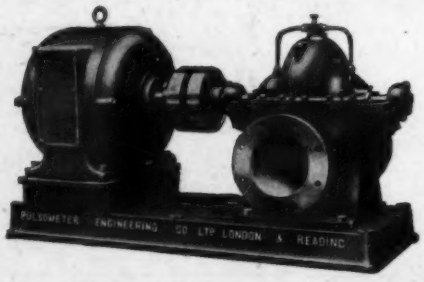

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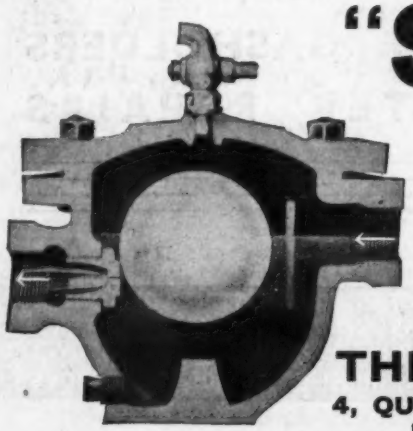

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